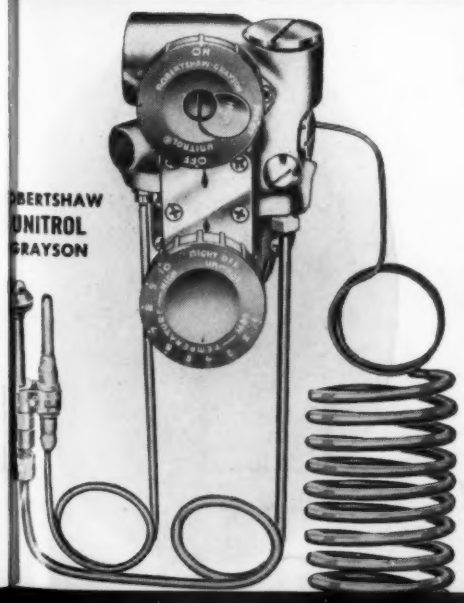
VOL. 178 No. 1 AMERICAN JANUARY, 1953

Gas Journal



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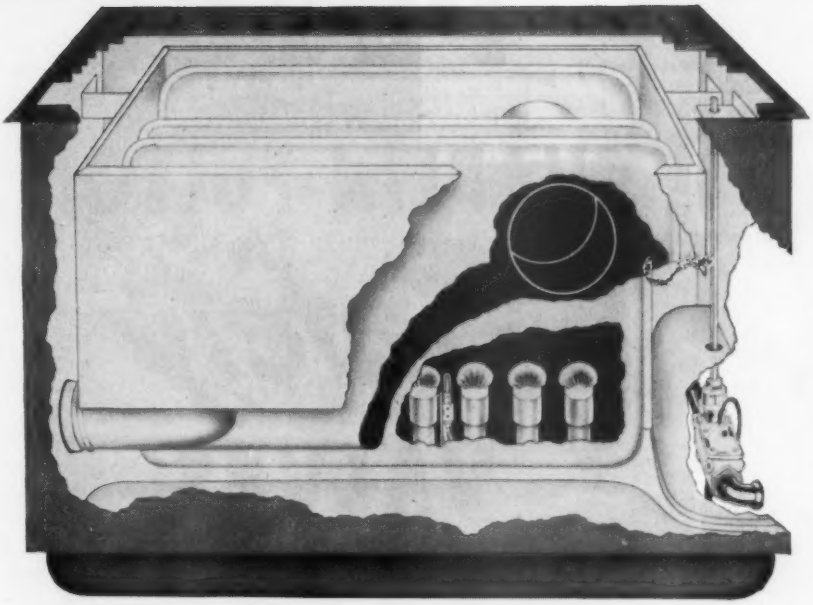

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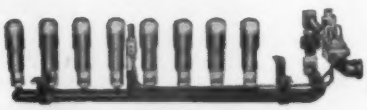

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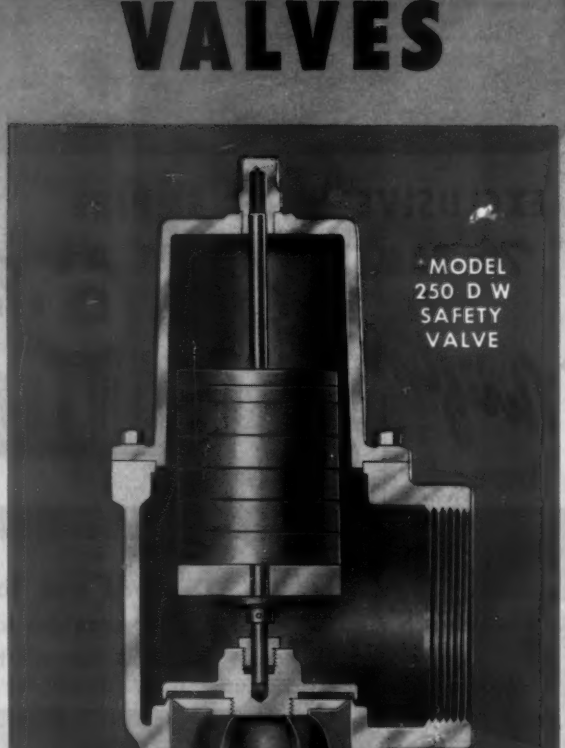

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AMERICAN Gas Journal
ESTABLISHED 1859

VOLUME 178 JANUARY 1953 NUMBER 1

This month...

The gas industry promotional program, embracing everything from customer service responsibility, through public relations, to sales and marketing policies is about ready to be taken out for individual presentation to the top executives of both the gas utilities and the gas appliance manufacturing concerns. This represents a big new effort about which everyone has heard a lot of discussion and about which very few know any of the details. The first step is to enthuse top-management with the potentialities of the program, and enlist the highest executive support for every one of its details. We wish the flying squads charged with this responsibility God-speed in their endeavors.

• • •

Our *American Gas Fundamentals* series has just passed its twenty-fourth chapter, two full years of continuous presentation in AMERICAN GAS JOURNAL, and we are pleased to report that it is still going strong. Many companies have increased their initial group-orders so that more employees may have the industry educational material available for study and reference. We are proud to observe also that none have dropped by the wayside.

• • •

Readers who are removing their *Fundamentals* chapters from each issue of the JOURNAL and accumulating them into a textbook, as we have severely admonished them to do on numerous occasions, may be interested in a little booklet that we have just prepared, containing photographs and brief biographical sketches of the authors of the various chapters that have appeared during the first two years. We shall be glad to send one to any subscriber on request and, of course, without charge.

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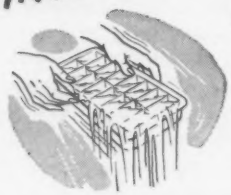

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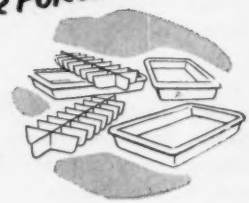

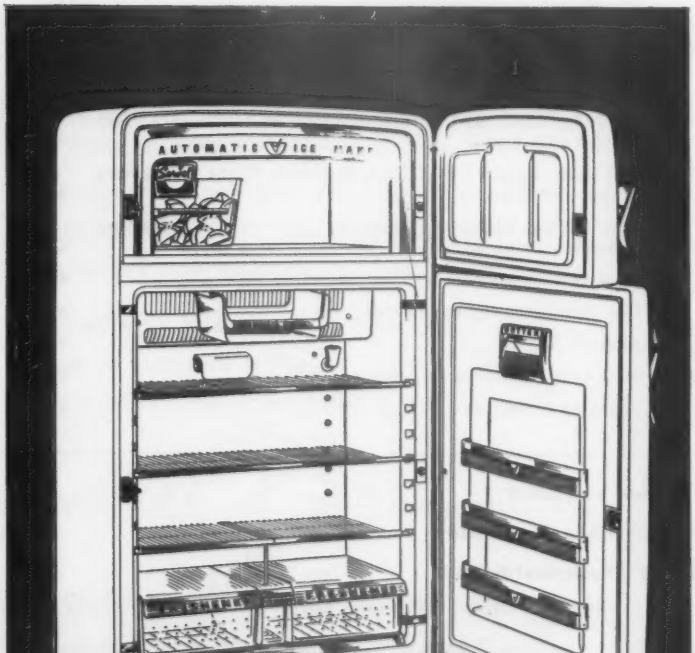

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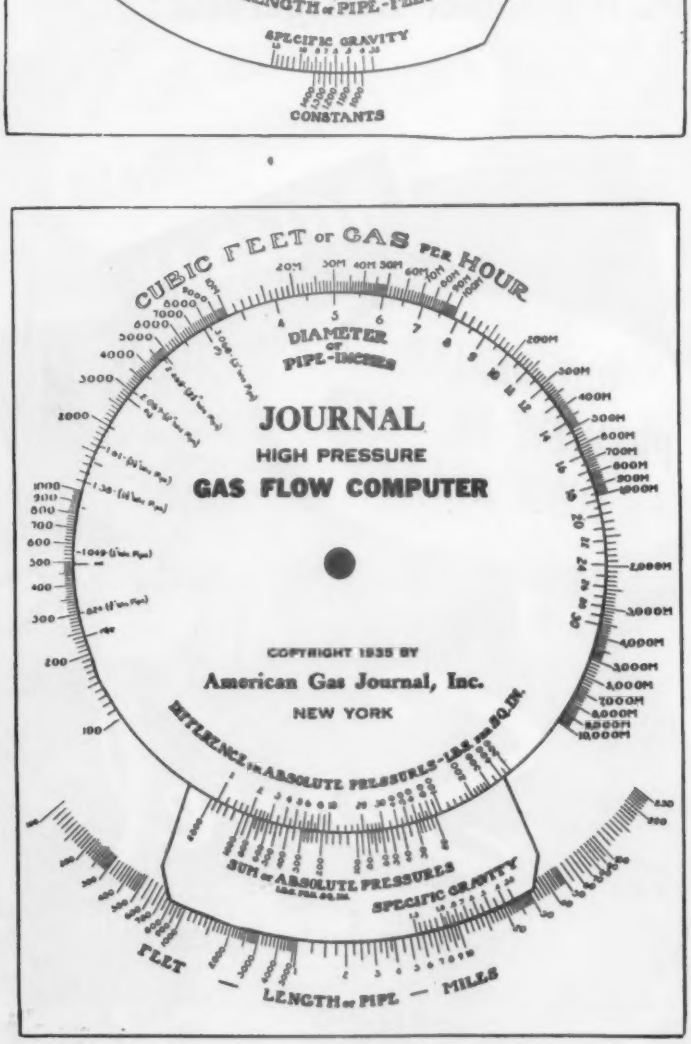

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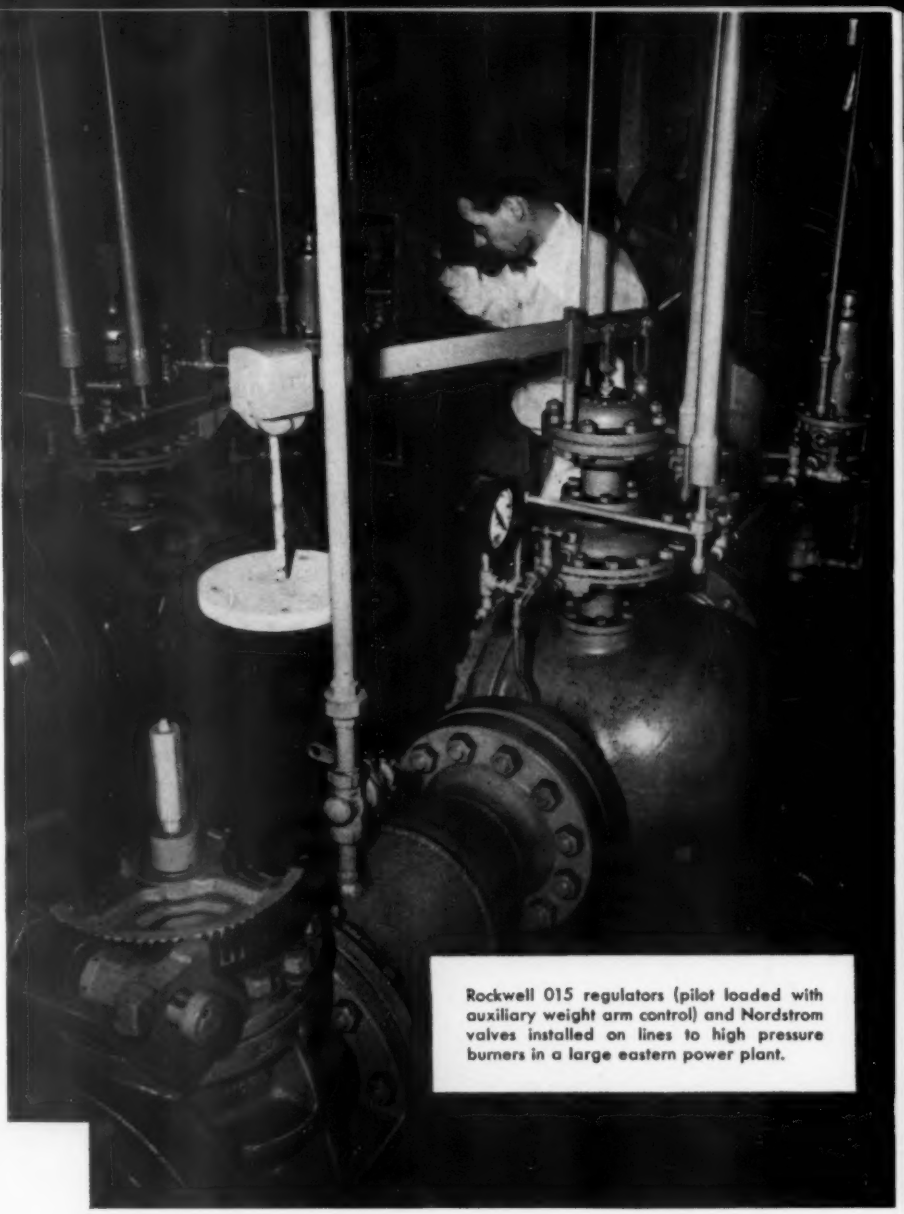

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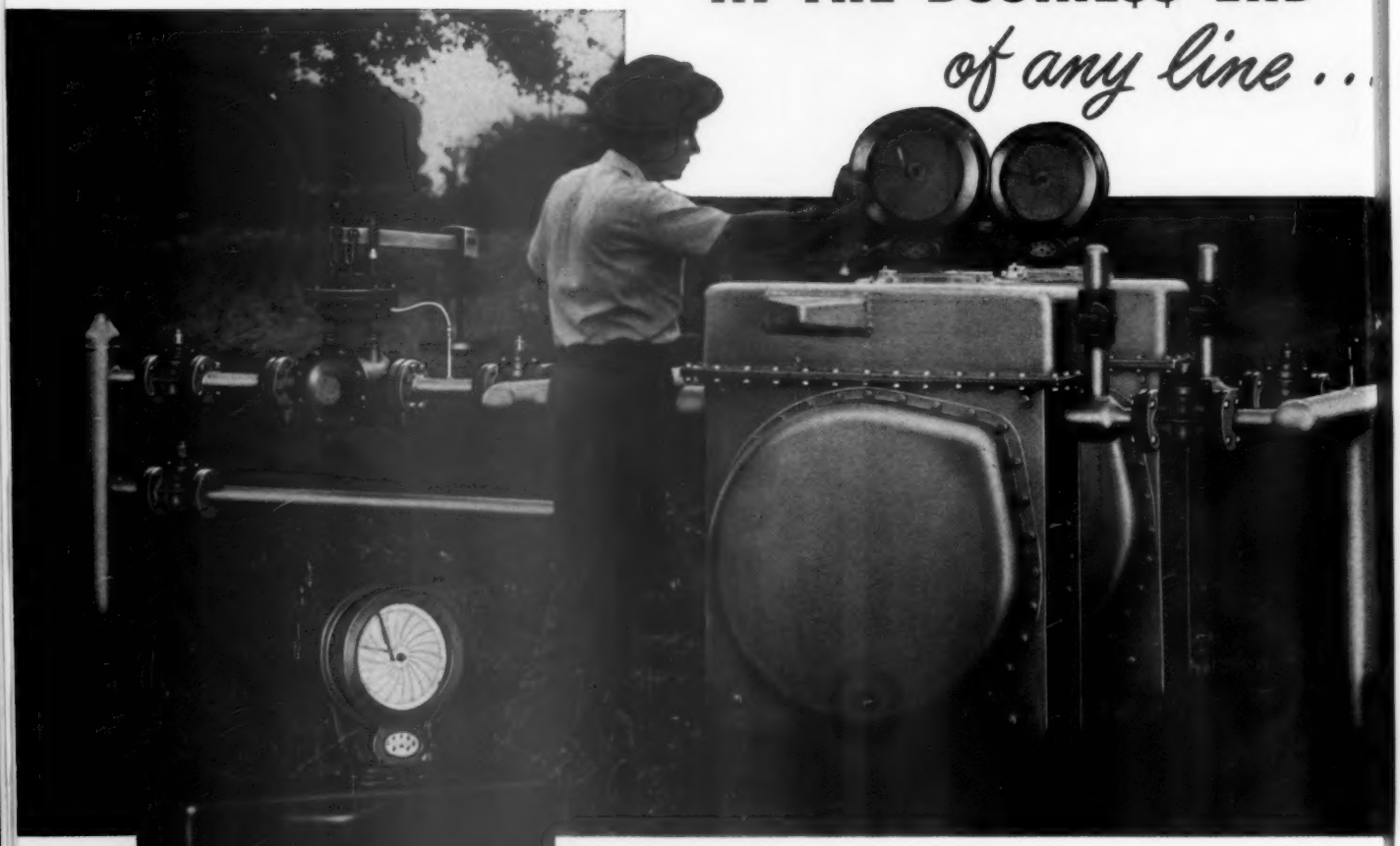

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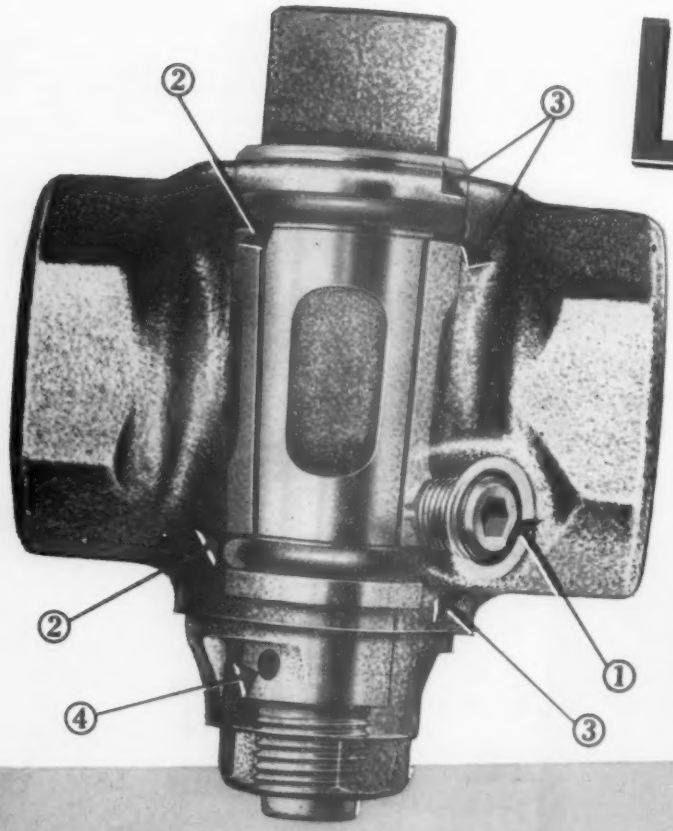

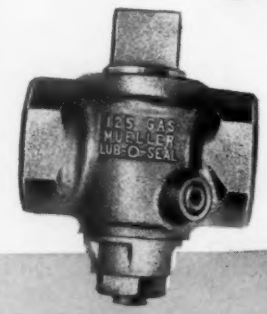

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Editorial:

For More Facts

WE HEAR assurances from every quarter now, that the gas utility industry and the appliance manufacturers are ready to inaugurate a new era of close cooperation in the promotion, merchandising and selling of gas-fired equipment of every kind.

It seems finally apparent that the long-neglected or, at best, often ineptly-handled problem of selling gas service through promoting the appliances that make gas service possible, is to be tackled with concerted determination by those who have everything at stake in its successful solution.

Certainly, in the solving of any problem, the determination to even undertake it is a first and prime prerequisite. But this can be viewed only as a sort of firming-up of good intentions. And good intentions we have had with us for many years, operating to little or no avail in stemming the determined push of electrical competition for the domestic load.

Before the liaison committees of AGA and GAMA wind up their deliberations they will have to buckle down to the business of outlining, step-by-step, just what they propose to do to elevate this new industry-accord to the stature and dignity of a program.

Elementary in the planning of a sales and promotion program is the analysis of the present condition and the long-range possibilities of the market that is to be sold. In the field of market analysis, we believe, many of the gas utilities are woefully weak. There are, we recognize, some areas where the operating companies maintain what amounts to a continuous program of market research, including customer attitudes and the analysis and interpretation of the sales trends. But this is a business tool that in many localities and for many companies has grown dull through long neglect.

Since the most vulnerable point of attack on gas service is through its cooking load, it is reasonable to assume that this will be the first to receive remedial attention in the industry-wide promotional plans now being formulated.

For this to be undertaken with any assurance of success, it will be essential that the trend toward electric cooking be analyzed objectively in terms of (1) income groups that have proven to be most susceptible to the "all electric home" appeal, (2) the home owner, renter or landlord status of purchasers of electric ranges, (3) the age of gas ranges replaced by electricity and (4) comparative rates for gas versus electricity for cooking.

Such information, if compiled by many companies and from many areas, would go far toward supplying data on the growing electrical encroachment on the gas base load, and would point up the steps that have to be taken to overcome and correct it.

Too often, we have heard sales executives bewail the fact that the style leaders of the community are leading the trend away from gas cooking. Other than the stock alibi that the gas industry has no promotional giants comparable to the leading manufacturers in the electrical industry, there has been little or no specific reason advanced for this trend, even in the localities where it is most pronounced.

Another analysis which should be undertaken simultaneously and as part of the study of the cooking pattern, is that of the relation between househeating with gas and the use of gas appliances for other services—cooking, water heating, refrigeration, laundry drying and incineration.

It is believed currently by many well-informed people in the industry that the sale of a househeating installation almost automatically safeguards and insures the use of gas for water heating. But does it have any influence at all on the retention of gas for cooking? Does it pave the way for the sale of the important newer base load appliances, particularly laundry dryers and incinerators? There are many opinions to be heard, often eloquently stated, but what are the facts statistically?

We believe that the two committees representing the gas utilities and the gas appliance manufacturers would be well-advised to set up the categories of market information that will be required, and then devise a simple uniform procedure for gathering the needed facts. The utilities' responsibility should be for the gathering of data on their own customers, including such information as the saturation of appliances in various use-classifications, the average age of equipment in service, the pattern and extent of various combinations of gas service in homes on their lines, with a possible exploration of the state of public opinion on gas for the several base load operations.

Manufacturers, working through their dealers and distributors, should be in a position to determine, from almost every installation sold, the type of appliance replaced, the source or lead that led to the sale, and the type of buyer who made the ultimate purchase.

The observation has sometimes been made that the electrical industry knows more about the market for gas appliances than the gas industry itself. We do not subscribe to this disheartening belief. But one thing is certain beyond any conjecture, the electrical industry knows all about *its own* markets; and it behooves the gas industry to follow its enviable and enlightened example.

Elliott Taylor

Gas Industry Seems Determined to Bat

THE gas industry goes into 1953 with a sizable and growing load of technical, economic and policy problems that might well be regarded for their potentially-high values as factors in advancing the national welfare and the industry—both, at the same time. Indeed, if there were no problems, there would be no reason to look toward the possibility of advancement.

Clearly, all the problems in the three categories—technical, economic and policy—will not be resolved finally during this year. Work on some of them is in progress; work on others remains to be started. The extent of accomplishment *during* this year is the pressing point of consideration.

What accomplishment can be anticipated before the year is out—based upon substantial evidence at hand?

Possibly the most immediate requirement for the gas industry, as a whole, is the broad, sincere and effective coordination of all factors that can be brought to bear on electric competition. It is realistic, we believe, to anticipate action here. (It won't come too soon, in view of the year-end pronouncements by leaders of the electric appliance and electric utility industries.)

The gas utility industry has heard the cold facts as they were presented by Frank C. Smith, at the American Gas Association convention, and can look to him for vigorous leadership in effective appliance and service merchandising. The base load of the utilities, substantially more than the cooking load as the direct result of the application of new developments and designs by appliance manufacturers, now gives the effectively-merchandising utility plenty of room to swing its sales arms.

The mood is aggressive

The gas appliance manufacturers are coming up with new and automatic appliances, new approaches to consumer-appeal and attractive modern styling that puncture the balloon of "the magic of electricity." Showmanship is appearing on the gas appliance merchandising stage, advertising and promotion of gas appliances are at least on the qualitative level of the competition and, in that connection, more factually reliable.

The appliance manufacturers are now in their second and more emphatic year of a public relations program that has developed evidence of a better recognition of the values of the appliances—thereby making the selling job an easier one. Working, as it does, through every medium of communication, this program is designed to drive continually toward the most favorable consumer-response to gas appliances.

Just as we put up our new calendar, we learned that AGA also is about ready to actuate a broad public relations policy and program, that includes provisions for localized application as required by specific utilities.

by Hilding H. Carlson
Managing Editor

There is bound to be accomplishment . . . in improved base load for gas utilities, if appliance developments, aggressive utility merchandising, promotion, advertising and public relations have any degree of coordination in delivering the sales power to the minds of customers, prospects and suspects—right where it belongs. How much accomplishment? No comment.

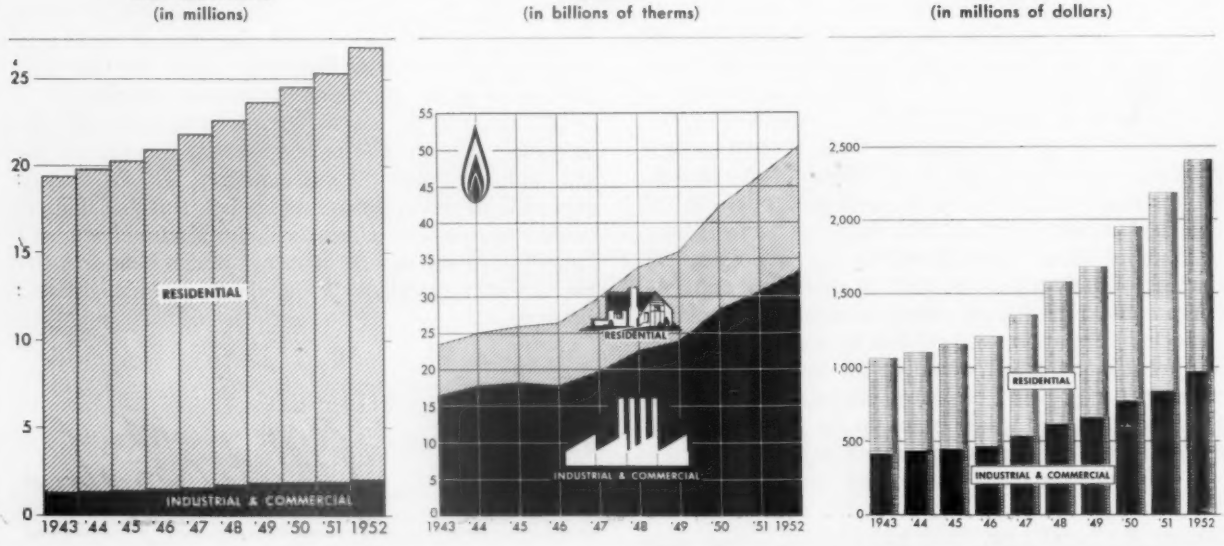
Two bright spots

We learn of more and more utilities that are buying costly modern insurance against failure of service to their customers by building standby plants. Some of them have been through cold-weather experiences in which they could just about smell gas from transmission pipelines. Others didn't want that kind of gas industry experience. This year will close with more of these plants in operation and others building. (We depart briefly from our script to express the hope that utilities that have or plan to have these facilities will publicize them heavily to their service areas as incontrovertible evidence of their interest in maintaining public service, come-what-may.)

Industrial application of gas, especially where precise time-and-tempera-

GAS UTILITY INDUSTRY CHARTS FOR 1952

Charts courtesy American Gas Association. 1952 data are estimated.



ttome of Its Major Problems This Year

ture are essential, continues to lead competitive fuels and electricity. The equipment manufacturers who are responsible for this high position of gas in processing the full range of materials, solid and fluid, can be depended upon to continue their research and development work on advanced equipment that will further enhance the industrial value of gas in the production of better products, faster and more economically.

There is bound to be accomplishment . . . among utilities in maintaining peak-period service as standby plants are added to provide that service. *There is bound to be accomplishment* . . . in advanced industrial application of gas—but the development and manufacture of industrial gas-fired equipment does not provide the gas that will keep the equipment in operation on a come-what-may basis, as required by the industrial customers of the utilities.

Do we see the possibility of coupling the two considerations—standby plants and industrial customers' requirements—for adequate service? *That accomplishment* would bring well-deserved high praise for the gas industry!

Problems beyond industry control

Some problems affecting gas utilities are beyond the confines of the industry for solution . . . state and Federal regulatory bodies are the factors here. However, continuation of the good fight and an even-stronger fight by utilities should change commission-thinking on the time-lag between increase in transmission pipeline gas rates and increases in distributing utility rates, especially in view of the non-retroactive compensation in most, if not all, commission decisions.

How much accomplishment in this area during 1953? Doubtful—but the obvious inequity of the situation must change *sometime,* so there is accomplishment of sorts in the cumulative effect of the fight.

The commissions also are in the picture of natural gas for the Pacific Northwest, with the international gimmick added. Let's be realistic, in this instance, by understanding and respecting fully the Canadian viewpoint in protecting the Dominion's own resources for the long-term internal demand. But we might ask, with equal respect, how long it will take to make the demand-estimate, with all the highly-qualified geological reserves estimates, the industrial economics data and the population data that have been assembled and analyzed? The hydroelectric plants in our Pacific Northwest seem to have been a bit dry recently, but gas is power, too, as Seattle Gas Company publicly emphasized recently, so our industrial Northwest will be pleased to buy any and all natural gas that is not included in the estimated needs of our friend and neighbor. May we, without appearing profound, observe that non-use is not conservation.

Accomplishment in 1953? *Hmmm.*

We shall apply the same comment, *hmmm,* to the currently white-hot controversy in New England which leaves some utilities in untenable positions that certainly are not of their own making . . . positions to which *they are not accustomed* after long histories of reliable service in the public interest. That utility problem is well-beyond the utility industry for solution. The question, here, is not one of accomplishment . . . what solution? . . . how soon? . . . what effects?

Those year-end pronouncements

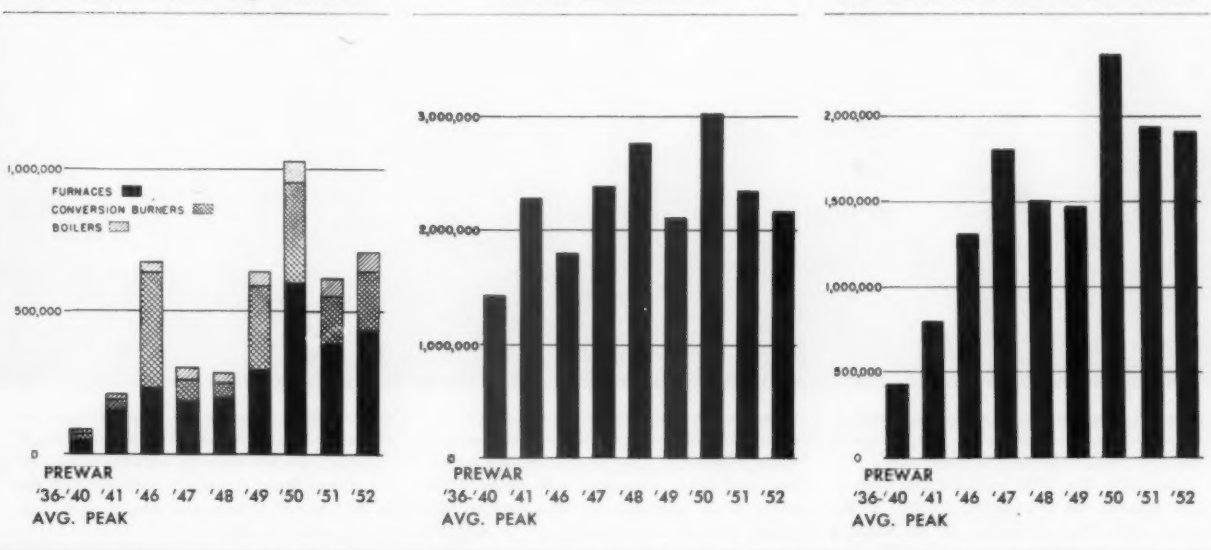
The opening of 1953 brought the usual rash of rhapsodic reviews of 1952 accompanied by truly artful anticipations for the twelve months ahead. We do not quarrel with the appropriateness of pointing with pride to the past nor the confident approach to the future; such statements have essential positions when based on fact.

A recurring element in the year-end statements by same industrial executives, however, tended to give the impression that the year would start on January 20, rather than January 1. Happily, we report, there was no evidence of that thinking in gas industry statements, so we leave the subject with a prescription of a psychological emetic for any who feel inclined toward approaching the year (or the next four years) with the

(Continued on page 38)

GAS APPLIANCE INDUSTRY CHARTS FOR 1952

Charts courtesy Gas Appliance Manufacturers Association. Unit shipments. 1952 data are estimated.



Industrial Application

Strip Annealing is High-Speed, Continuo

by Charles A. Turner, Jr.
Metallurgist
Selas Corporation of America

THE development and adoption of high-speed radiant gas equipment for continuous annealing of tinplate has revealed new and advantageous potentials for the modern strip mill.

Presently, continuous annealing may utilize electrical or gas equipment for heating. Electricity has economic limitations which, to date, have restricted application to production lines operating at speeds lower than 300 fpm. Gas heating may be indirect using of radiant-type tubes; or direct-fired, with radiant panels made of refractory materials.

Charles A. Turner, Jr.

Continuous annealing in direct-fired radiant gas heating equipment can be a ninety-second process from preheat-to-cooling, with the strip moving at 1,000 fpm. Uniform physical properties with improved drawability of the continuous-annealed strip result in a "universal" temper, currently accepted by tinplate consumers and designated as Temper TU, applicable where T1 to T4 are conventionally specified.

A comparison of tinplate produced by the high-speed continuous method and by the slow batch method can best be approached by considering the metallurgical effects of annealing.

Low carbon steel for tinplate is composed principally of ferrite, the predominant constituent which is quite soft, and cementite (iron carbide) which is hard. Cementite is nearly always present as discrete particles (carbide particles) varying greatly in size, shape and distribution. The microstructure and, therefore, the physical properties are determined by those factors which influence size and shape of the ferrite grains, and the type and distribution of the carbide particles. The primary purpose of annealing low carbon steel for tinplate is to remove the strain hardening and embrittlement induced by cold reduction of the steel to the desired strip thickness. Substantially all the softening, in this case, occurs by the process of recrystallization wherein newly-formed grains of ferrite replace the distorted, cold worked grains.

Since this annealing is carried out below the lower critical transformation temperature, no austenite is formed. However, a portion of the carbides may be altered from their original form and distribution because ferrite is capable of dissolving approximately 0.03 per cent carbon at 1,335°F. The cooling rate from annealing temperature will influence the ultimate hardness depending upon the temperature at which precipitation of this dissolved carbon takes place.

In comparisons of the batch and continuous annealing methods and their products, the heating and cooling cycles and their effects upon grain size and carbides are foremost considerations.

Batch annealing compared

Batch annealing generally requires 25 to 35 hours for the charge to reach the annealing temperature in the range of 1,150° to 1,250°F. Soaking for temperature uniformity may require 15 hours. Up to this point, recrystallization has taken place and grain growth has proceeded. Also, the ferrite has dissolved that portion of the carbon determined by the limit of solid solubility for the particular annealing temperature. Cooling under the hood for as long as 60 to 75 hours provides a slow cooling rate in which the dissolved cementite is precipitated as rather massive particles, quite similar in form and distribution to that existing before annealing. This precipitation is substantially complete above 1,100°F. during the cooling.

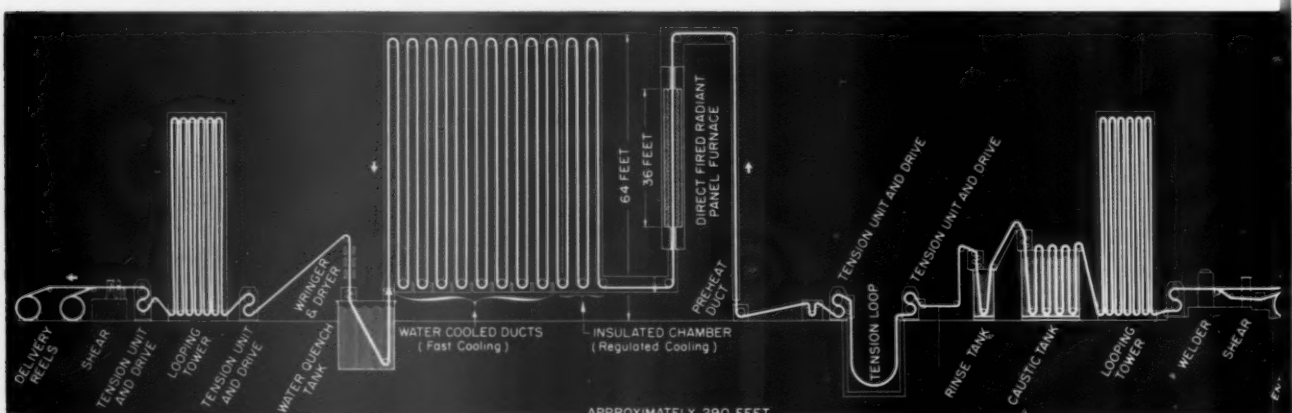


Figure 1—The lineup of equipment used in the high-speed strip annealing line, including the direct-fired radiant gas panel furnace, is shown here. The strip travels from right to left, through the equipment, starting at the entry reels. The mechanism of the looping tower, at the right, permits continuous movement of strip through the radiant furnace while tail-end of one reel is spliced to the head-end of the succeeding reel; similarly, the action of the looping tower at the left permits cutting the strip for re-reeling at the delivery end. Uniform temperature is maintained in all the radiant burners, with the heat input automatically coordinating with the speed of the moving strip. Annealing strip for tinplate in this line is a 90-second process with the strip moving at 1,000 fpm.

Direct-Fired Radiant-Gas Mill Equipment

The only flexibility of metallurgical control indicated in the batch annealing treatment lies in control of recrystallized grain size through varying annealing temperatures and the time at temperature. To meet the requirements for different tempers in the finished product, further control must be obtained through variation in chemistry, in prior mill practice or in subsequent cold reduction (from one to five per cent) of temper rolling.

The following table of tempers applies to tinplate, batch annealed and temper rolled.

TEMPER	HARDNESS (Rockwell 30t)	USE
1	45/51	Deep draws: screw tops, beer cans.
2	48/54	Medium draws: bottle caps, pie pans.
3	52/58	Regular can bodies, ends where stiffness is not required.
4	58/62	Regular bodies, stiff ends.
5	63/67	Stiff body stock.
6	68/72	Beer can ends, extreme buckling resistance.

Short-cycle continuous anneal

The short-cycle continuous anneal differs from the long-cycle batch anneal in two important respects which account for the differences in physical properties and drawability.

First, the time the material is above the recrystallization temperature in the continuous process is very short, producing a relatively fine-grained structure. Second, the cooling rate is faster producing a finer, more random distribution of the carbides dissolved in ferrite during heating and precipitated during cooling.

Microstructures and physical properties of thin gauge sheets, after slow and fast anneals, are compared in Figure 2.

The finer grain of the continuous annealed product may account for two to four points of additional hardness (R_{30t}) over that of the batch-annealed product while the faster cooling may account for an additional increase of as much as four points of hardness.

The latter observation was confirmed by tests in a pilot line. Batch-annealed strip, subsequently reheated continuously to 1,300°F at 100 fpm, did not reveal any change in grain size, but there was a change in the form and distribution of that portion of the total carbon dissolved and precipitated during the fast heating and cooling. The original batch-annealed strip hardness of $R_{30t}51$ was increased to $R_{30t}55$ by the subsequent treatment.

Seconds instead of hours

Continuous annealing in direct-fired radiant gas equipment is a rapid heating process involving seconds instead of hours to reach annealing temperature.

No soaking is required since the strip, heated in one vertical pass, is at a uniform temperature, leaving the furnace zone. Pilot line tests have demonstrated amply that any soaking time, within the practical limits of a high-speed continuous line, fails to produce any apparent further improvement in physical properties.

The cooling rate is controlled to provide time for the carbon dissolved in ferrite to precipitate above 800°F, avoiding the trapped solid solution which, at room-temperature, will result in age hardening. Below 800°F, the strip may be cooled at any convenient rate.

The heating and cooling cycle for continuous annealing at 650 fpm is:

Preheat to 400°F.....	7 seconds
Heating 400° to 1320°F..	3.5 seconds
Cooling 1320° to 800°F..	50 seconds
Cooling 800° to 400°F..	55 seconds
Total.....	1 minute, 55.5 seconds

Shorter cooling cycles, obtained in a pilot line for continuous annealing at speeds to 150 fpm, showed no aging in the strip. In one case, a chamber at room temperature cooled the strip from annealing temperature to 800°F in about 17 seconds. In another case, the strip was cooled to 750°F in 40 seconds. The hardness after both cycles was identical to that obtained in the production cycle at 650 fpm, and did not change when this strip was given an accelerated aging test by immersion heating to 600°F for one minute.

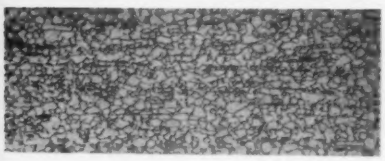
Improved drawability

The improved drawability of the continuous-annealed product, it appears reasonable to conclude, lies in the finer, more uniform distribution of the carbides affected through solid solution in heating and precipitation in the temperature range from 800° to 1,000°F during cooling. Certainly, the finer grain size has little influence on drawability since batch practice develops coarser grain structure for the deep-draw material.

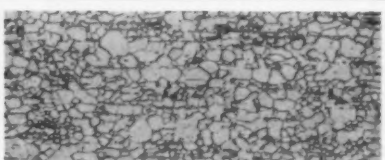
The carbide-distribution assumption is strengthened by considering that the rapid annealed material exhibits more uniform elongation throughout the entire gauge length under tensile test. In other words, the uniformly distributed fine carbides spread their strengthening effect over the full stressed area to minimize the localized yielding or flow of the ferrite in deep drawing. This localized yielding is a cause of cracking through excessive cold working. Also, this accounts for the limitations of the material when localized stretching is required, as in extruding or dimpling.

"Universal" temper

Continuous-annealed tinplate, after



Rapid anneal of single sheet. 1,350°F, four seconds, no hold.
Yield strength .....55,000 psi
Tensile strength .....62,000 psi
Total elongation in 2" 19%
Uniform elongation 15%
Rockwell hardness .....63.



Slow pack anneal. 1,220°F, held at temperature for twelve hours.
Yield strength .....44,000 psi
Tensile strength .....50,000 psi
Total elongation in 2" 21%
Uniform elongation 12%
Rockwell hardness .....57.

Figure 2—MICROSTRUCTURE AND PROPERTIES OF THIN GAUGE SHEET
Magnification X100

being subjected to the indicated heating-cooling cycles, will show a hardness in the range of R_{30T} 53-to-58, varying according to chemistry, melting practice and hot mill practice. The product would fall into either the T3 or T4 specification, based on batch annealing strip. However, a high degree of drawability has been demonstrated by the TU temper continuous-annealed strip applied to production of medium-draw and deep-draw parts, for which T2 or T1 tempers were previously specified. Also, the product shows elimination of dog-earing, or the tendency of batch annealed tinplate to flow irregularly in deep draws.

Corrosion resistance

Anneal border, the characteristically shaded area having a stained or etched appearance extending about four inches from both edges of batch annealed strip, has been eliminated in continuous-annealed strip. Anneal border is associated with the infiltration and reaction of the protective gas atmosphere between adjacent coil laps during the long batch cycles. The corrosion resistance of the anneal border in batch strip is well below the resistance of the area that is further from the edge. The extremely short exposure of the strip to atmosphere at elevated temperatures during continuous annealing results in a uniformly good corrosion resistance, from edge to edge. Elimination of stickers provides advantageous surface improvement.

Uniform direct-fired gas heating

In the continuous annealing process, the steel strip is exposed to the direct-fired radiant gas heat source so that the length and width of the strip receive a uniform and constant degree of heat which produces specified physical properties, constantly and uniformly.

Successful application of continuous annealing at speeds higher than 600 fpm depends, basically, upon high-speed heat transfer.

The direct-fired radiant gas method provides the required heat transfer rate through a high temperature gradient that maintains the furnace temperature substantially above the anticipated peak strip temperature.

The equipment is rugged and compact, thereby reducing strip conveyor and tracking problems in the furnace. A relatively short length of the strip—about 50 feet—is in the heating zone.

Demands for early, urgent deliveries can be met with much more convenience due to the possibility of continuous annealing the strip directly after it has been cold rolled. And, with the can companies' requests for lighter gauges and stiffer plate, tinplate manufacturers will be able to meet the requirements with a product that has good forming properties combined with greater stiffness.

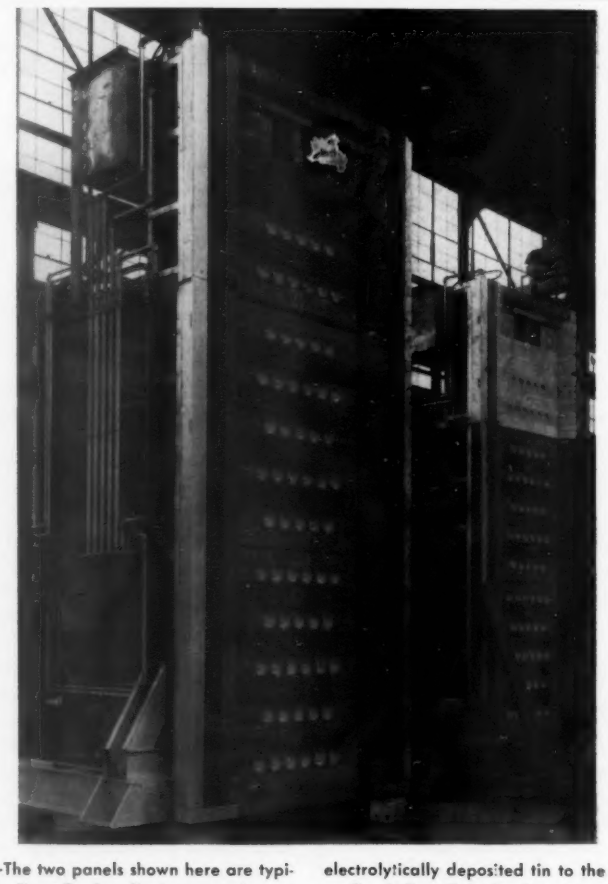


Figure 3—The two panels shown here are typical of the direct-fired radiant gas equipment applied to high-speed heat processing of continuously-moving strip material, such as annealing steel for tinplate or, later, fusion of electrolytically deposited tin to the strip. Generally similar direct-fired equipment is being applied to other heat processing, such as continuous drying of printed paper, singeing textiles, removing moisture from roofing material.

The furnace

The furnace is constructed as two vertical heating panels. In the closed position, the panels form the combustion chamber, sealed against air infiltration. This is safeguarded by the constant maintenance of a positive pressure from the combustion gases. Responding quickly to control devices, the panels open horizontally to prevent strip burning due to line stoppage.

Two typical direct-fired radiant gas panels are shown in Figure 3; an individual radiant ceramic burner in Figure 4.

The uniform temperature of the incandescent radiating burner cup surfaces is controllable from 1,300° to 2,800°F by fuel input regulation.

Gas and air are premixed in controlled ratio and pressurized by a "combustion controller," before entering the burners.

In direct-fired radiant gas annealing equipment, the gas-air mixture is maintained with a slight deficiency of air to avoid the presence of free oxygen in the products of combustion. While carbon dioxide and water vapor in these furnace gases are oxidizing components, their reaction rates are not as pronounced as that of free oxygen and are partially offset by the presence of reducing components, carbon monoxide and hydrogen.

Tinplate is annealed continuously at 1,300°F without forming a surface oxide in this controlled atmosphere in the short heating time of 3.5 seconds.

Increased air deficiency, in tests to approach reducing atmosphere conditions, has not demonstrated advantages. While carbon dioxide content decreased and hydrogen and carbon monoxide increased, the resulting sacrifice of heating efficiency could be compensated only by slower heating rates or increased furnace lengths.

Radiant heating

Combustion of the gas-air mixture is completed well within the ceramic burner cup. There is no flame impingement on the strip.

The hot, completely burned gases leave the incandescent cup-shaped burners at temperatures slightly above that of the cup surface and pass over the re

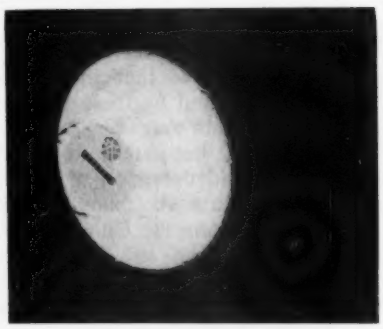


Figure 4—This operating radiant gas burner, for direct-firing, is similar to the burners installed in the high-speed strip annealing equipment. Flame length is confined within an extremely short distance from the burner tip, thereby eliminating any flame impingement on the material being processed. The incandescent burner cups and the refractory furnace panels transmit radiant heat to the continuously moving strip.

fractory panel walls for further transfer into radiant energy.

Heating, in these continuous annealing units, is essentially radiant but the substantial convection effect of the hot gases is not ignored.

The waste gases are carried, in counterflow to the strip travel, from the top of the furnace, where the strip enters through a preheating duct. At the higher speeds, above 600 fpm, where the preheat is used to full advantage to raise the strip to 400°F as it enters the heating zone, heating efficiencies of 33 per cent have been attained.

Varying strip widths are heated uniformly in direct-fired radiant gas annealing equipment by heat input control through vertical burner manifolding which permits cutting off the outside burner rows when necessary.

Oxidation prevented

Oxidation is prevented during cooling by maintaining a reducing atmosphere in the cooling ducts, and precipitation of the dissolved carbides above 800°F is accomplished through regulation of the cooling rate. Cooling above 800°F is in insulated ducts; below 800°F, in water cooled ducts.

The protective atmosphere gas in the cooling ducts is the NX-type: approximately 92 per cent, by volume, nitrogen; hydrogen, five per cent; carbon monoxide, three per cent. Moisture content of the gas entering the ducts is maintained at a low level, approximating 0.03 per cent by volume, equivalent to a dewpoint of *minus* 30°F, at 30″ of mercury.

The protective atmosphere gas must be supplied to the ducts at a rate which will assure a positive internal duct pressure. Generating capacity in excess of this minimum volume provides for faster purging on start-ups when the ducts may have been opened. A total capacity of 12,000 cfh meets these requirements.

Strip leaving the cooling ducts at approximately 300°F is water quenched to 180°F and dried. Further cooling to 125°F takes place in travel through the looping tower before coiling. This final cooling permits temper rolling to be applied directly after annealing rather than waiting 50 to 100 hours after uncapping as in the batch method.

Palm oil removed

Palm oil, a lubricant remaining on the strip from the cold reduction operation, can be removed completely without washing, during continuous annealing. Unwashed strip annealed in pilot line tests had clean and bright surfaces, without deposit or residue, and responded normally to subsequent tinning and corrosion testing. The tests, with constant heat input, strip speed and gauge, revealed that unwashed strip developed a peak temperature 150°F higher than the peak for washed strip.

Present practice in continuous annealing includes the washing stage as an integral part of the annealing line. Immersion of the strip in a caustic solution of sodium orthosilicate at 180°F, is followed by a 180°F water rinse and hot air drying. Then the clean and bright strip enters the preheating duct and furnace.

Removal of palm oil film by exposure to high temperature radiant heat for expulsion with the products of combustion is an anticipated feature of future continuous annealing equipment, with consequent improvement in heating efficiency due to the altered surface emissivity, as well as the cost savings in washing equipment, floor space and operation.

Summary of advantages

The characteristics of the high-speed continuous annealing equipment provide marked product and production advantages over the batch annealing method. In summary, they are

1—An improved product, with uniform physical properties, a universal temper, a high degree of corrosion resistance and improved surface.

2—Strip washing is in-line—eliminated as a separate operation—and may be found to be entirely unnecessary.

3—Production rates are higher. Close scheduling is entirely practical.

4—Coil inventory can be minimized, with consequent savings in storage space.

5—Coil handling is reduced to a minimum. No bridge cranes or up-enders are necessary.

6—Floor space for annealing equipment is reduced materially.

7—Overall capital investment is reduced and so is the unit cost of production.

8—Equipment flexibility permits convenient changes in widths of strip being annealed. Also, scheduled shut-downs do not involve either idle operation of equipment or long start-up periods.

SEATTLE GAS CO SELLS GAS IN TIE TO POWER SHORTAGE

Intense interest in the Pacific Northwest's acute electrical power shortage has been utilized by the Seattle Gas Company to remind Seattle citizens that gas also is power.

Headlined "Gas is Power," the six-column signed newspaper ad pointed out how and where "gas can help in this disastrous power shortage."

GAS IS POWER

Facts You Should Know at a Time When the Northwest's Industrial Future Is at Stake

When the experts talk about the dire threat to this area's industrial future, it's *your* future they're talking about. You have a right to know how and where gas can help in this disastrous power shortage.

There are two basic kinds of power. One is *mechanical*—it turns the wheels so essential to industry. The other is *thermal* or heat-producing. For mechanical power, electricity does a topnotch job, both efficient and economical. For heating purposes, nothing surpasses gas*.

Just as electricity has proved its superiority for lighting, so it is best adapted for the turning of wheels in home and industry. And increasingly important, with our growing aluminum industry, electricity is essential in certain electro-chemical processes.

Gas, on the other hand, has recognized superiority for thermal use—or heating. This means water heating, cooking, refrigeration, air conditioning, house heating, and industrial heating processes.

Gas has large and important resources to offer! At this crucial time, there can be no question of competition. Both sources of power must be utilized efficiently, *where they can do the best job.*

Wise policies can properly balance our power load so that each kind of power supplements the other and both are used where they can serve our needs best.

As Bernard Goldhammer, economist for the Bonneville Power Administration, has said: "If we can use natural gas for thermal energy we will be able to move more of the electric energy up a step on the technological ladder and use it in chemical processes (that is, aluminum plants). In this manner we will secure the highest possible use of our resources."

On the other hand, increasing the use of our electricity for thermal or heating needs can only further restrict the electric power available for industrial plants . . . further reducing production, employment and income.

Today and in the future, the Seattle Gas Company stands ready to serve where it can serve best—by supplying thermal power for heat.

Pulling together, we can make the highest possible use of our resources, avoid catastrophe, and once more work toward the bright future that should be our heritage.

SEATTLE GAS COMPANY
(Signed) N. HENRY GELLERT
President

* *The Seattle Gas Company's potential capacity will keep pace with all industrial and residential demands . . . with the coming of natural gas to the Northwest our resources will be unlimited.*

Seattle Gas Company's newspaper ad

With the driest year in Pacific Northwest history, home consumers have been continuously alerted by press, radio, television and other means to conserve electricity and "save jobs." Industry, with a Defense Electric Power Administration order for a ten per cent minimum cut, has faced a constant threat of further reductions.

Basic Familiarity With Rate Problems Held Desirable

by Leo T. Parker
Attorney at Law
Cincinnati, Ohio

EVERY gas company executive and many other gas company employees, frequently have occasion to consider legal questions involving gas rates. In some instances, the correct solutions of rate problems avoid complicated legal controversies and, consequently, save of time and money. Although it is impossible to avoid all legal controversy, executives who are familiar with the established law on this subject may build logical foundations upon which to win law suits.

"Is a city ordinance or state law valid which abolishes minimum fixed charges established by a gas corporation?

Generally speaking, such a law is void, according to a late higher court decision.

Several years ago the state of Oklahoma passed a law which prohibited gas companies from making a fixed minimum charge, it was shown in Avant Gas Service Company v. Corporation Commission, 89 P. (2d) 291. This law provided further that the consumers shall be charged only for the gas used or consumed, as registered by the gas meter, and stipulated a flat meter rate without a service charge.

A gas company lost money for a number of years in furnishing gas to the inhabitants of a municipality solely by reason of this state law. The higher court held the law invalid, and said, "The evidence, without room for doubt, shows that the gas company cannot continue in business and serve the citizens at a flat meter rate alone and avoid ultimate loss of its property. It is entitled to operate its business and to realize a reasonable profit therefrom. Any statute that would deprive it of either of those rights stands squarely in opposition to that portion of the 14th Amendment to the Federal Constitution, U. S. C. A., which declares that the state shall deprive no person of his property without due process of law. Though the company's business is stamped with a public interest, it is entitled to operate the same and to receive from such operation a fair return in profit to be calculated under certain established rules and principles applicable in such cases. If the State in its attempt to regulate rates and service goes beyond that point of restriction, it must be concluded that it has exceeded the limitations placed upon it by the Federal Constitution. . . ."

A review of leading higher court decisions disclose that monthly service charges and minimum monthly bills have been recognized by the higher courts in a number of states as necessary elements in fixing reasonable rates. This is so because the courts decided that the cost of service without a minimum charge unequally distributes gas costs among consumers. See City of Rochester v. Rochester Gas and Electric Corporation, 233 N. Y. 39; and Rivelli v. Providence Gas Company, 44 R. I. 76.

In another case the court considered a statute of New York fixing a maximum flat rate per thousand cubic feet for gas, prohibiting a flat service charge. See New York & Queens Gas Company v. Prendergast, 1 Fed. (2d) 351. Concerning the question of fixing rates under those statutes, the court announced this rule, "It is within the power of a Legislature to prescribe the form of charges by a gas company, and a statute prohibiting a 'service charge' is in itself constitutional and valid; but when, taken in connection with another statute or order of a Public Service Commission fixing a maximum price for gas, it so reduces the entire permissible charge that it becomes confiscatory, and it is unconstitutional."

A higher court, summing up the legal effect of a state law of this nature, said, "Here, as already stated, the evidence in its entirety warrants holding that in prohibiting the so-called service charge to consumers of gas at Niagara Falls, the gas company is estopped from allocating the cost of production to the consumers in equal proportions, and, moreover, is prevented from earning a reasonable profit upon its invested capital. The enforcement of the particular statute in controversy must therefore be held to be confiscatory." See United States Light and Heat Corporation v. Niagara Falls Gas and Electric Company, 23 F. (2d) 719.

Not unconstitutional

"Is it true that the Sherman and Clayton anti-trust laws basically prohibit monopolistic practices by sellers of any and all merchandise and commodities, including gas?"

While the answer to this question is *yes*, the courts agree that the object sought to be attained by these Federal anti-trust laws is not that every "combination" is illegal, but rather to forbid the formation and operation of illegal combinations. The mere "fixing" of gas rates does not violate the United States Constitution although this contention often has been presented to the courts.

Therefore, a law is valid by which gas rates are fixed, providing such rates are not so low that the income capable of being earned by the gas company is unreasonably inadequate. This is so although the law prevents gas companies from making contracts to sell gas.

In the leading case of Great Northern Utilities Company v. Public Service Commission, 293 Pac. 294, it was disclosed that a public service commission fixed the precise maximum and minimum rates to be charged for gas. The commission acted by authority of a state law. A suit was filed on the contention that the statute is unconstitutional, void and invalid. However, the higher court held the law valid.

"It is conceded that legislation may be enacted determining the maximum charge to be made by a public utility," the opinion said, "but the specific objection here is that to fix a *precise* rate is violative of the Fourteenth Amendment to the Constitution of the United States, in that it deprives the utility of its constitutional right of freedom of contract in relation to its property. . . . We are of the opinion that the power conferred by our statute upon the Commission to fix precise rates does not contravene the provisions of the Fourteenth Amendment to the Constitution of the United States."

Court has jurisdiction

"If a gas company is dissatisfied with gas rates specified by the public service commission, what is next and proper procedure?"

If a gas company is not satisfied with rates established by the public service commission, the sole and usual method of review from the order is by an appeal to a court.

Under ordinary circumstances new evidence cannot be presented to the court upon the appeal. Therefore, since the court will usually refer strictly to the testimony and data presented and made before the public service commission, it is essential that the Commission shall conduct a fair and open hearing, and the gas company must be given opportunity to challenge the result found by the commission. See the United States Supreme

(Continued on page 28)

Testing and Records Help Determine Adequate Gas Odorization Rate

by Amos H. Abbott
Gas Engineer
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HOW many gas operating men know if their gas meets these or similar specifications? Our industry has quite a history of odorizing practices but for some unknown reasons we have mostly avoided definitiveness in meeting any odor specifications based on diluted mixtures.

A common utility odor-specification is in terms of pounds or gallons of odor per million cubic feet. In many cases it is not possible to measure daily quantities of odorant used or to know positively that such amounts of odor are added daily to the sendout gas.

Customer calls of leaks originating mostly from customer's appliance or piping are extremely important and gas utilities are most diligent in watching and responding to such calls and correcting the condition. These leak calls are an indication to the utility company that customers are noticing the odor in escaping gas. A common practice is to watch customer leak calls and control odor quantities to give results of perhaps one leak call per week per thousand customers.

This is a rather rough method of gauging odor intensities or effectiveness, and in the smaller distribution system it is quite impractical. A tabulation of leak calls per thousand customers in several gas systems over a period of several months shows the results in each system where a constant odor level was maintained.

GAS	CUSTOMERS	LEAK CALLS PER 1,000 CUSTOMERS PER WEEK	PER MONTH
Water gas	8,000	.1—2.4	1.2— 7.2
Mixed gas	10,000	.3—3.0	3.8—10.9
Natural gas	3,500	0—2.3	2.0— 4.5
Natural gas	90,000	.7—1.4	3.2— 9.8
Propane-air	1,000	0—2.6	0— 3.6
Propane-air	4,000	0—2.4	1.9— 6.0

If we were to control odor from experience of weekly or monthly leak calls we would have to be quite broad minded and not too impatient. Even in the larger systems it is not always practical to adjust odor quantities weekly or monthly based on the previous leak call experience.

Chemical tests for odor are not uncommon. Recording instruments will chart sulphur quantities that have been added to the gas in the form of odorant. Chemical solutions and paper tests are made mostly for sulphur content. Such methods require technical control. The recording instrument is quite satisfactory but expensive. It is not certain that such chemical tests will always satisfy the basic odor specification.

More on room tests

Most of us have made room tests for odor determination. A known amount of gas is mixed with air in a room and observers note when odor is detected. This conforms to a smell test related to proportion of gas to air but it is quite a cumbersome test and is not too practical.

Then, we have odor determination by smelling straight gas coming out of a pipe or a gas-air mixture from a burner and probably well above the lower explosive limit—a very crude determination. In the past, most of us have probably smelled the straight gas coming out of a pipe and decided the odor intensity was adequate, but the customer never smells straight gas. He smells, or should smell, gas diluted with 99 parts of air.

Smell tests where equipment has been used to proportion gas and air have been in use in recent years. Some simple and positive method for testing gas for odor is desirable—equipment and procedure that will indicate odor intensity in a dilute gas-air mixture in a range of approximately 20 per cent of the lower explosive limit. Here are some of the experiences our company has had in odor testing of both natural and LP gases in very dilute and known mixtures with air.

First a very brief description of testing equipment—a small, electrically driven blower furnishes air. A small and controllable amount of gas is added to the air. The air-gas mixture comes out of an opening where it is smelled by the observer who also tests this mixture with a combustible gas indicator. The customary method is to adjust the gas valve to give the degree of odor wanted and then read the instrument in terms of percentage of the lower explosive limit. The equipment is portable and many observations have been made of the gas from a kitchen range in the customers' homes without contaminating the atmosphere.

One of the first things thought necessary in this procedure was a description of odor intensity that an observer could recognize by his sense of smell—an odor intensity that could be consistently reproduced. The sense of smell can be trained to judge odor intensity, just as the eye can be trained to judge distance, arm muscles can be trained to judge weight and the ear can be trained to judge tone pitch.

Three defined odor intensities

These tests were to be made, not by laboratory technicians, but by men of mechanical or clerical training or by service men in eleven separate gas systems. For practical purposes we tried to define three degrees of odor intensities that would be encountered in dilute gas-air mixtures, all of which would be readable on the scale of a combustible gas indicator:

Faint—just barely noticeable.
Strong—the smell begins to get sickening.
Distinct—between *faint* and *strong*, positively noticeable.

For several months our men were asked to take observations of the three odor intensities. With those descriptions of odor as a guide, our observers, working independently, were all in very close agreement as to what constitutes a *distinct* odor. The *faint* and *strong* odors were expected to be determined easily.

With our definitions of odor intensities we find that on the scale of the combustible gas indicator the reading for a *distinct* odor is roughly three times that for a *faint* odor, and the reading for a *strong* odor is roughly between two and three times that for a *distinct* odor. We have taken advantage of this ratio in the following manner: We are specifying that both our natural and LP gases can be odorized to give a *distinct* odor at 15 per cent of the lower explosive limit, and that daily tests be made and odor quantities be adjusted to insure and to record that such odor intensities exist. With the thought that an observer making daily tests for a *distinct* odor might let his sense of smell drift, we ask for readings for both *faint* and *distinct* odors.

One pound of commercial concentrated odorant per million cubic feet of natural gas should give a *distinct* odor at less than 20 per cent of the lower explosive limit of the mixture, provided the gas does not pass through unusual conditions that will extract odor. Also, we observed a variation in odor intensity of LP gas-air mixtures as between winter, when the liquid is vaporized in vaporizers, and in summer, when vaporization takes place in the storage tanks. Adjustments are made with a by-pass odorizer to maintain constant odor level.

Some observations

Many items of useful information became available from this method of odor testing.

It can be determined quite definitely if gas has sufficient odor at all rates of flow.

(Continued on page 29)

Algonquin Ordered by Court to Remove Installed Pipeline Section in New York

ALGONQUIN Gas Transmission Company was ordered by a New York Supreme Court justice on January 8th to remove two and one-half miles of its pipeline already installed in northern Westchester county, New York, within 45 days, and to reimburse the landowners involved for all land damages. The strip of pipeline starts close to the east bank of the Hudson River, just south of the Peekskill city line.

The difficulties were compounded on the same day when the United States Circuit Court of Appeals in Boston denied Algonquin's petition to obtain a temporary certificate to finish other construction of the line in southeastern Massachusetts. In ruling on that petition, the court affirmed Federal Power Commission's denial, on the ground that FPC lacked authority, of another Algonquin petition for a temporary certificate.

The immediate effect of the New York Supreme Court order was to cause Algonquin to try again to buy easements across the property that is involved. Then, failing that, the company would be forced to attempt to get similar easements on nearby property, to skirt the contested area. If that second move fails also, the progress of the line would be blocked.

Immediately after issuance of the order, on January 8, it was generally anticipated that Algonquin would move immediately for some superseding court order that would at least hold the removal-order in suspension.

The January 8 removal-order was reported on page one of *The New York Times*, with a representative of property owners observing that the removal order was the first affirmative action as a result of recent court reversals on the company's claim to *eminent domain*.

Algonquin was granted a certificate of public convenience and necessity in 1951 by FPC, with implied right of *eminent domain*, whereby the company could build the pipeline across private land, with indemnification to the owners.

When the property owners involved in the latest order refused to grant easements, Algonquin obtained, from a New York Supreme Court justice, an order for immediate occupancy with damages to be determined by referees.

All the pipe has been laid, in the area involved; most of it has been covered. Two connections remained to be welded near the Hudson River, when FPC's certificate of convenience and necessity was invalidated by a Federal District Court in Philadelphia. FPC would not grant a new certificate and the United States Supreme Court declined to interfere.

The New York Supreme Court justice who issued the immediate-occupancy orders canceled them on December 9, after this combination of circumstances at the Federal level. The removal order, early this month, was signed by the same justice.

Counsel for a group of the property owners was reported as having said that offers for easement purchases by Algonquin were being renewed but that some owners were determined not to sell at any price. At the same time, he said that before any owners would consent, an adequate price for an easement must be paid, the safety regulations of the New York State Public Service Commission must be complied with and the commission should determine whether houses may be built close, and how close, to the pipeline.

Gas Sales Went Up in November

Sales of the gas utility industry to ultimate customers during November, 1952, aggregated 4,600 million therms, an increase of 9.8 per cent over sales of 4,189 million therms in the comparable 1951-month, American Gas Association reports. For the twelve months ended November 30, 1952, gas utility sales were 51,508 million therms, up 7.7 per cent over a year ago, when sales totaled 47,843 million therms. The AGA November index of total gas utility sales was 352.2 per cent of the 1935-1939 average.

The increase in sales of utility gas is attributed to the constantly growing number of new gas customers and to increased consumption of gas by industrial consumers.

Natural gas utility sales in November totaled 4,340 million therms, a gain of 10.7 per cent over 3,920 million therms sold in the comparable 1951-month. For twelve months ended November 30, 1952, natural gas sales were 48,202 million therms, an increase of 8.5 per cent over sales of 44,417 million therms in the same period in 1951. The November index of natural gas sales stood at 386.5 per cent of the 1935-1939 average.

Manufactured and mixed gas sales in November totaled 260 million therms, a decline of 3.5 per cent compared with 269 million therms sold a year earlier. For the twelve months ended November, 1952, sales of manufactured and mixed gas totaled 3,306 million therms, a decrease of 3.5 per cent from comparable 1951 figures.

American Gas Fundamentals

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NATURAL GAS
- *Geology
- *Drilling and completion
- Methods of estimating reserves
- Chemicals from gas

MANUFACTURED GASES
- *Coke oven gas; producer gas, blue gas; carbureted water gas
- *Reformed gas
- *Hi-Btu oil gas
- Interchangeability

LIQUEFIED PETROLEUM GASES
- *Sources, properties and uses

BASIC GAS LAWS
- *Perfect gases
- Supercompressibility

TRANSMISSION
- *Pipe lines
- *Corrosion and pipe protection
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- Pipe coatings and protection methods

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- Theories of rate making
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*** Indicates chapters published since January 1, 1951; available without charge to new subscribers to American Gas Journal.**

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American Gas Fundamentals *is a comprehensive compilation of basic gas facts to guide any gas utility employee toward a broader understanding of the industry as a whole.*

The series is designed to be removed from each current issue of AMERICAN GAS JOURNAL *and filed in a ring binder where it may be accumulated into a text book of permanent usefulness. Material should be filed under the major subject head appearing in the upper right hand box at the head of each chapter.*

Chemicals From Gas

THE quantities of basic chemicals produced from gas, regardless of their source, like solid, liquid or gaseous material, are subject to rapid change and consistent growth. The tremendous expansion of that part of the chemical industry employing raw materials has occurred for the most part in petroleum refineries and in chemical plants adjacent to or near refineries, natural gasoline plants, or some other source of petroleum, refinery gas, natural gas or liquified petroleum gas. Transcontinental natural gas pipelines, in some cases, have been employed to supply hydrocarbon raw material for chemical synthesis.

The use of natural gas hydrocarbons, to provide energy through combustion, constitutes their greatest use. However, their use as chemicals or raw materials for chemical synthesis is continuing to grow in importance.

In 1950 the hydrocarbon raw material consumed in producing chemicals was equivalent to only 0.7 per cent by weight of the domestic petroleum and natural gas requirements and 1.9 per cent by weight when all fuel for the operation of chemical plants was included. Comparable estimated figures for 1975 are set at 2 per cent and 5.5 per cent, respectively.

The true worth of natural gas as a raw material in chemical synthesis may be better evaluated from the estimate that, by 1975, about 50 per cent of all the hydrocarbons employed in chemical synthesis will find their end product in plastics. It is estimated, also, that by 1975 upwards of $5 billion in new plant investment will be required by the petro-chemical industry.

United States Bureau of Mines defines natural gas as a mixture of hydrocarbon and non-hydrocarbon gases. The higher content of the heavier hydrocarbon groups results in the term "wet gas" and in their absence from natural gas streams the term "dry gas" applies. Bureau of Mines also suggests that the mixture (natural gas) includes hydrocarbons in the range of from *methane* through *heptanes;* the nonhydrocarbon group to include *helium, nitrogen, carbon dioxide, hydrogen sulfide* and other *sulfur compounds.*

On the basis of modern extraction and separation methods, the components of natural gas can be separated and grouped as follows: First, *non-hydrocarbon material* (helium, nitrogen, carbon dioxide and sulfur compounds); second, *dry gas* (methane and ethane with some propane); third, *liquified petroleum gas* (propane, isobutane, and normal butane); and fourth, *natural gasoline* (isobutane through normal heptane).

Many recent processes and products have been developed that utilize the components of natural gas as the starting raw material in the production of useful products. The processes by which the components of natural gas may be shattered or rearranged by thermal, electrical, catalytic or photo-synthetic methods, or allow for the inclusion of elements like oxygen, chlorine or nitrogen into the hydrocarbon molecule may be grouped into eleven major classifications: decomposition, oxidation, halogenation, nitration, hydrogenation, dehydrogenation, alkylation, polymerization, isomerization, cyclization and aromatization, and hydrocarbon and other synthesis.

Decomposition

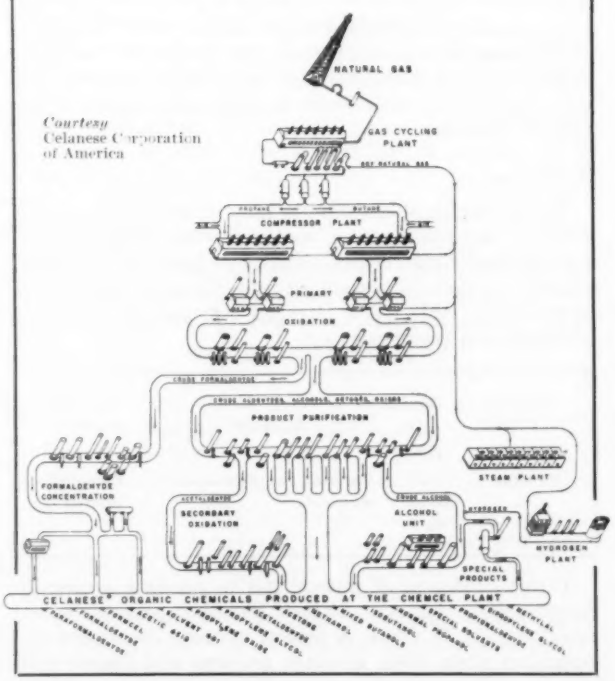
Decomposition is the splitting of the hydrocarbon molecule into smaller molecules or into carbon and hydrogen, with the aid of catalyst, by electric discharge or by heat alone (pyrolysis). Recombination of some of the products into new compounds is possible.

Methane	→	Carbon +	Hydrogen	Heat, catalyst or electric arc
CH_4		C	$2H_2$	
Ethane	→	Acetylene +	Hydrogen	Heat or electric arc
C_2H_6		C_2H_2	$2H_2$	

There are many commercial operations employing decomposition methods to split the hydrocarbon molecule. One of the oldest and most widely used is that of *carbon*

OXIDATION OF NATURAL GAS HYDROCARBONS FOR PRODUCTION OF ORGANIC CHEMICALS

Schematic Flow Chart



Courtesy Celanese Corporation of America

black manufacture. Channel black or "impingement carbon" or "arrested combustion" carbon yields blacks with approximately 95 per cent total carbon content.

Furnace black by the Gastex and Furnex processes employ a flame inside a furnace with a limited supply of air to prevent complete combustion. Thermal black made by thermal-decomposition, or the Thermatomic method, cracks natural gas over regenerative brick to form hydrogen and carbon black. The exit gas in the Thermax process is composed of about 85 per cent hydrogen and smaller quantities of methane, carbon dioxide, carbon monoxide, illuminants and nitrogen.

The manufacture of *hydrogen* by this method was begun in 1922 for the production of *synthetic ammonia.* Presently, the greater portion of carbon black is derived from natural gas with an average yield of about 2.60 pounds per Mcf. In the future, increasing amounts of carbon black will come from oil, whereby about three pounds of carbon black may be made per gallon.

In the production of *acetylene* from natural gas, heat must be supplied to satisfy the large endothermic heat of reaction. To supply this heat of reaction, three methods have been used; first, electric arc or spark; second, passing heat from an auxiliary such as a regenerative furnace; and finally, by the partial combustion of some feed gas with air or oxygen.

The oxidative process provides the heat for *acetylene* formation by burning a portion of the feed gas with oxygen. This process has been used commercially at Oppay, Germany, and two commercial installations are reported in this country using oxygen.

The cracking of natural gas by thermal and electrical methods at present accounts for all such commercial operations. The catalytic decomposition of methane into hydrogen and carbon momentarily by freshly reduced iron, as reported in the Clarkiron process, is of interest and if developed on a commercial scale, would see natural gas playing an increasingly important role in the reduction of iron ore.

Other products obtained from natural gas by decomposition methods include gases such as *propylene, butylene, isobutylene* and *butadiene;* liquids such as *benzene, toluene* and *cyclic compounds;* and the solids, *naphthalene* and *anthracene.*

Oxidation

The oxidation of natural gas may be defined as the reaction of the hydrocarbon molecule with oxygen, air or oxygen-containing compounds, by heat or catalyst, whereby oxygen is introduced into the molecule, or the hydrocarbon molecule is changed into carbon monoxide and hydrogen (synthesis gas).

Propane $2C_3H_8$	+ Oxygen O_2	→	N Propyl Alcohol $2C_3H_7OH$			Heat and pressure
Methane CH_4	+ Water (Steam) H_2O	→ Carbon Monoxide CO	+	Hydrogen $3H_2$		Heat and catalyst

Direct oxidation of natural gas to produce *methanol, formaldehyde* and *acetaldehyde* has been practiced commercially for 25 years. A similar process, in commercial operation since 1946, oxidizes *propane* and *butane* with air. In the latter process the reactants, *propane, butane* and *air,* react under controlled conditions to form the oxidized hydrocarbons which are soluble in the quench water terminating the reaction. The specified chemicals are separated and produced by most modern methods of absorption, distillation, extraction, extractive and azeotropic distillation, evaporation, dehydrogenation, hydrogenation and hydrolysis.

Natural gas hydrocarbons will react with steam over supported nickel catalyst at 1,440 to 1,600°F to form *carbon oxides* and *hydrogen.*

Since the gaseous mixture resulting from the steam-hydrocarbon reaction consists of *carbon monoxide, carbon dioxide* and *hydrogen,* it is possible to produce mixtures of carbon monoxide and hydrogen for various synthesis operations like Methanol, Oxo Process and Fischer Tropsch synthesis. When synthesis gas is produced by indirect heating, an equal amount of natural gas fuel is required to maintain the operating temperature of 1,400 to 1,600°F as is decomposed to synthesis gas.

Synthesis gas may also be produced by reacting *natural gas, oxygen, steam* and *carbon dioxide.* This method of partially oxidizing natural gas with oxygen at high pressure does not require fuel gas to maintain process temperature, but this saving is offset by the cost of producing high-volume, low-cost oxygen.

Synthesis gas may be further oxidized with additional steam over iron catalyst at 700°F to form additional hydrogen and carbon dioxide.

The carbon dioxide may be removed by conventional methods and *high purity hydrogen* produced which is available for the production of *synthetic ammonia* and in several branches of the chemical and food industries.

In addition to the production of the chemicals noted above, other oxy hydrocarbon chemicals produced are *ethyl, isopropyl,* and *butyl alcohols, acetone, formic acid* and *acetic acid.*

Halogenation

The halogenation of natural gas may be defined as the reaction of the hydrocarbon molecule with a halogen (fluorine, chlorine, bromine, or iodine), promoted by light, heat or catalyst. One or more halogen atoms may replace hydrogen atoms in the hydrocarbon molecule.

Methane CH_4	+ Chlorine CL_2	→	Methyl Chloride CH_3CL	+	Hydrogen Chloride HCL	Heat, light or catalyst

In the chlorination of methanes, a two-column oil absorption system is used to separate *ethane* and *nitrogen* from the methane stream. The chlorination of methane is highly exothermic and it is necessary to remove heat to limit the reaction temperature. This is done by conducting the chlorination procedure in stages. By limiting the amount of chlorine introduced at various stages, the heat of reaction is absorbed by the gas stream as the reaction is photochemically activated by a mercury arc lamp. The use of modern procedures results in the formation of *methylchloride, methylene chloride, chloroform* and *carbon tetrachloride. Chlorinated ethane* and *propane compounds* may be produced by a similar process. Thermal activation may replace photochemical activation.

Other chlorinated hydrocarbons which may be formed

are *ethyl chloride, thylene chloride, polychloroethanes, chloropropanes* and *chlorobutanes.*

Nitration

The hydrocarbon molecule may react in the vapor phase with nitric acid by the aid of heat and pressure to form nitration products.

Methane	+	Nitric Acid (vapor phase)	→	Nitromethane	+	Water	Heat and pressure
CH_4		HNO_3		CH_3NO_2		H_2O	

The nitrocompounds of value as solvents, like paint and varnish removers, are also the links for the production of innumerable invaluable organic compounds produced by complicated organic synthesis.

Hydrogenation

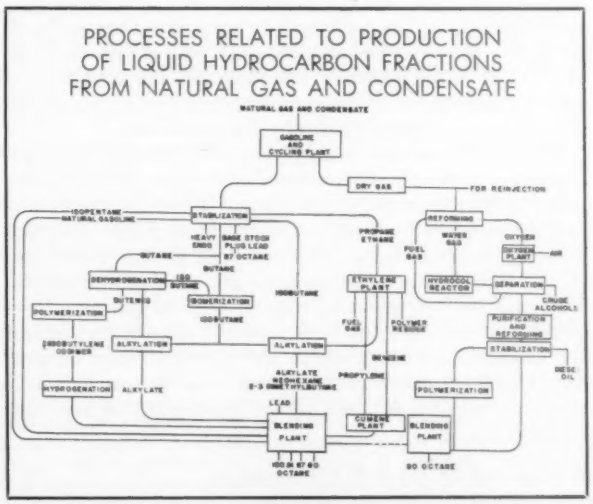
Hydrogenation may be of the destructive or non-destructive form. The first applies when the molecule is cracked in the presence of hydrogen to form more than one hydrogenated lighter molecule, the latter the addition of hydrogen when no cracking occurs.

The large scale use of hydrogen for the hydrogenation of various petroleum products was initiated in 1931. Since that time hydrogenation processes have found numerous applications, both on a large and small scale, in several branches of the chemical industry and in the food industry, still using hydrogen derived from natural gas.

DESTRUCTIVE							
Pentane	+	Hydrogen	→	Propane	+	Ethane	Heat and catalyst
C_5H_{12}		H_2		C_3H_8		C_2H_6	
NON-DESTRUCTIVE							
Butylaldehyde	+	Hydrogen	→	Butyl Alcohol			Heat and catalyst
C_3H_7CHO		H_2		C_4H_9OH			

Dehydrogenation

A form of controlled decomposition in which hydrogen is removed from the hydrocarbon molecule is called dehydrogenation.



Butane	→	Butylene +	Hydrogen		Thermal, catalytic
C_4H_{10}		C_4H_8	H_2		
Butylene	→	Butadiene +	Hydrogen		Thermal, catalytic
C_4H_8		C_4H_6	H_2		

The dehydrogenation of natural gas ingredients to form raw materials like *ethylene, propylene, butylene* and *butadiene* is of ever-increasing importance. Ethane-propane mixtures and butane are primarily the starting raw materials for their production. It is primarily from these unsaturated raw materials that large-volume *plastics, synthetic rubber* and chemicals like *ethyl, propyl* and *butyl alcohols* are produced. The importance of these unsaturated raw materials derived from natural gas increases daily as the country shifts to the use of larger volumes of plastic materials.

Alkylation

Alkylation designates the chemical reaction whereby an olefin and isoparaffin or aromatic combine under conditions of high temperature or by the use of a catalyst.

Ethylene	+	Isobutane	→	2, 3 Dimethyl Butane	Catalyst
C_2H_4		C_4H_{10}		C_6H_{14}	
Propylene	+	Benzene	→	Cumene (Isopropyl Benzene)	Catalyst
C_3H_6		C_6H_6		$C_3H_7CH(CH_3)_2$	

Alkylation procedures by far are of the greatest importance in the production of *aviation fuel.* The alkylation of butylene and isobutane provide *isomeric octanes* or *isooctane alkylate.* As noted, ethylene and isobutane when alkylated in the presence of a catalyst provide 2, 3 dimethyl butane, while when high pressures and temperatures are employed neohexane results (2, 2 dimethyl butane). These dimethyl butanes are of value in the production of aviation fuel because of their rich and lean mixture ratings, also because about 1.12 gallon of dimethyl butane alkylate results per gallon of butane as compared to only 0.675 gallon of isooctane alkylate (using isobutane and butene as feed). In addition to the production of cumene, *ethyl benzene* may be produced.

Polymerization

The combination of molecules into chain molecules of higher molecular weight is termed polymerization.

Ethylene	→	Polyethylene		
n C_2H_4		$(C_2H_4)_n$		
Propylene	+	Amylene	→	Octylenes
C_3H_6		C_5H_{10}		C_8H_{16}

The polymers of ethylene are of importance in the production of *synthetic rubbers, plastics, lubricants* and *additives.* Likewise, the polymers of propylene, butylene, isobutylene and butadiene are valuable raw materials in the production of *aviation gasoline, lubricants, rubber* and *rubber substitutes.* The polymerization of mixed molecules, in addition to many chemical products, give motor

fuel which when hydrogenated becomes of more value as aviation fuel.

Isomerization

Isomerization occurs when the hydrocarbon molecule changes its geometric pattern without change of its empirical composition or molecular weight.

Pentane ——→	Isopentane	Thermal and catalytic
CH_3-CH_2-CH_2-CH_2-CH_3	CH_3-CH(CH_3)-CH_2-CH_3	

The normal hydrocarbons of butane and pentane may be transformed into the respective isocompound and thereby be of more effective use in the preparation of *aviation fuel* or directly as a blending component in the case of *isopentane*. By means of a catalyst extremely high transformation yields are possible.

Cyclization and Aromatization

By cyclization and aromatization processes paraffinic molecules may be changed to cyclic compounds then to aromatics by dehydrogenation.

Hexane →	Cyclohexane +	Hydrogen	Thermal, catalytic
C_6H_{14}	C_6H_{12}	H_2	
Cyclohexane →	Benzene +	Hydrogen	Thermal, catalytic
C_6H_{12}	C_6H_6	$3H_2$	

Aromatic chemicals like *benzene* and *toluene* are being produced in increasing quantities from natural gas constituents by catalytic reforming of the six or seven carbon atom raw material respectively.

Hydrocarbon and Other Synthesis

Hydrocarbons similar to those from petroleum may be formed from synthesis gas (carbon monoxide and hydrogen).

Synthesis gas →	Straight paraffin hydrocarbons +	Water
$nCO+(2n+1)H_2$	C_nH_{2n+2}	H_2O
Fischer-Tropsch reaction (catalytic)		

Synthesis gas, derived from natural gas and oxygen, can be used for the production of *premium quality gasoline, Diesel fuel, fuel oil* and *chemicals* (Hydrocol process).

The Oxo process, developed in Germany and practiced commercially in this country, consists of the reaction of synthesis gas with an olefin to produce an *aldehyde* which can, in turn, be hydrogenated to an *alcohol*. (Reaction applied to olefins having from 3 to 20 carbon atoms).

The use of hydrogen, derived from natural gas via synthesis gas, for the production of *synthetic ammonia* has increased greatly. In 1940 only 5 per cent of the synthetic ammonia production in the United States was from natural gas; in 1950, about 45 per cent came from this source. The production of ammonia from nitrogen of the air and hydrogen from natural gas will continue to increase as will related products like *nitric acid, ammonia nitrate* and *ammonia sulphate*. Other hydrocarbon synthesis provide for the production of many organic chemicals such as *formaldehyde, methyl alcohol, carbon disulphide, anhydrous hydrogen chloride, ethylene oxide* and *derivatives*.

Non-Hydrocarbon Constituents

The only known raw material from which helium can be extracted commercially is helium-bearing natural gas. The present world helium reserves, upwards of five billion cubic feet, are in the United States and the Bureau of Mines is the only known producer of helium in commercial quantities.

Sulfur is being produced from natural and refinery gases at a rate of more than 200,000 tons per year.

Many natural gas purifying operations yield by-product *hydrogen sulfide* either alone or in combination with carbon dioxide. Disposal of this gas presents a problem. An economical solution finds the conversion of hydrogen sulfide to *elemental sulfur* by a modification of the original Claus process.

Some natural gas streams are high in carbon dioxide content. When removed by conventional absorption process this gas is available for use as a *refrigerant* (dry ice), *fire extinguisher charge, food preservative* and *beverage carbonator*.

Chemicals from Oil and Coke Oven Gas

In the processing of liquid and solid fuels for the manufacture of fuel gas, various chemical by-products result which are short in supply with an increasing demand.

Beside the basic *coal* and *oil tars*, important chemicals produced are the liquids *benzene, toluene* and other *heavier cyclic compounds;* and the solids *naphthalene, anthracene*, and the various *forms of carbon*. *Sulfur* is also a by-product of the manufactured gas industry.

Summary

Chemicals from gas result when base materials like solid, liquid or gaseous fuels are subjected to varying conditions of photolytic, catalytic, heat and pressure. In some instances the base materials are of value as a chemical source when certain ingredients are separated and concentrated in the absence of chemical change as in the case of helium. To the greater extent, the base materials must be modified and changed to new chemical compounds by some methods or under some conditions. This results, in many cases, in a fraction of mixed chemicals being produced which must be separated by expensive chemical procedures which, to be economically sound, should take place close to the source of raw material. The role that the catalyst plays in these magic transformations, although observed, is yet to be explained by the physicists.

This raises the future possibility that when catalyst activity may better be explained that it in turn will make possible the fracture, rearrangement and growth of the hydrocarbon molecule by modified electrical impulses, resulting in better control of the reactions with greater yields and purity of the desired product in the production stream. This may see our great arteries of natural gas pipe lines delivering hydrocarbon raw materials to market sources for chemical products where the chemical may be produced under more desirable conditions than at locations presently selected because of the availability of raw materials.

This chapter on Chemicals from Gas was prepared by Frank H. Dotterweich, Director, Division of Engineering, Texas College of Arts and Industries

Common Stock Money During 1953 Seen as Competitive Consideration

by John F. Falvey

Financial Editor

IN their recent favorable market action, corporate common stocks have been ignoring entirely the smaller aggregate of profits anticipated for the 1952 calendar year. Latest estimates are that corporate net earnings this year will drop to between $17.5 and $18 billion, for a decline of about six per cent from the $18.7 billion total reported for 1951.

John F. Falvey

Proceeding contra to this sober view of the earnings picture, share prices by reason of their recent market advance now are approximately 10 per cent above the average of a year ago, with the result that the market price-earnings ratio has climbed to the highest point—currently better than 13 times for listed stocks—reached in six years.

It might be pointed out, however, that share prices reflect the opinion of investors about the future rather than the present. And in their recent and present trend they give recognition to the belief that the change in Federal administration on January 20 can only be for the better. One would have to rove far and wide without finding anyone sincere in the belief that it could possibly be otherwise.

An important element in the outlook for corporate profits is the current stretch-out in defense spending. The uptrend in military expenditures in evidence for many months ended last July, when they reached a monthly post-war peak of $4.7 billion. In recent months they have been far below that level, and continued curtailment in such expenditures will bring the national budget more in balance, permit taxes to cover the government's actual cash outlays and improve the outlook for business. An increasing segment of our outstanding economists seems to be leaning to the thought that there will not be a cash deficit in the Federal budget in the fiscal year ending next June 30.

A direct result of the defense spending stretch-out and non-recurrence of this year's inventory losses should be an improvement in corporate profits, which might well increase to nearly $19 billion in 1953. And on the basis of cash-flow, the corporate results should be even more favorable than the estimated profits would indicate. This follows from the fact that the provision for depreciation, including accelerated amortization, may total more than $12 billion. Although new bond and stock issues this year are expected to exceed $7 billion, this will not equal this year's provision for depreciation. . . . With only moderate changes in receivables and short term debt in prospect next year, a favorable conclusion must be drawn as to the outlook for dividends. Granting that the trend of corporate profits follows along the lines now indicated, dividend payments in 1953 are likely to be around $10 billion against approximately $9.5 billion this year.

Corporations currently are paying out about 55 per cent of available earnings in the form of cash dividends, compared with somewhat less than 50 per cent a year ago. Despite the increase the payout ratio still is most conservative.

Upturn in industrial activity is expected to mean additions to inventories, reversing last year's trend, and the same development will mean 1953 expenditures for plant and equipment that at least equal the 1952 level. The utility industry outlay is estimated at about ten per cent above last year.

With bond offerings of about $5 billion totaling 30 per cent more in 1952 than in the preceding year, and only slight increases being shown in preferred and common stock offerings, the normal expectation should be for greater dependence on equity financing this year than in 1952. This very factor should impel a liberal dividend policy on the part of corporate managements since this will mean greater market acceptance for the new offerings.

The likelihood of more corporate dividends by industry in general is something for the utilities to keep in mind for the very important reason that in their quest for new common stock money they will be forced to compete with industrials and others for the additional funds they need.

Adding to the competitive forces normally at play in the new issue market is the increasingly strong likelihood that the Federal government this year might decide on undertaking new financing on a 30 year-three per cent interest basis to check the trend toward ever-increasing floating debt.

(Continued on page 29)

INDEX OF YIELDS : SELECTED UTILITIES STOCKS

	Dec. 1952	Nov. 1952	Oct. 1952	Sept. 1952	Aug. 1952	July 1952	June 1952	May 1952	Apr. 1952	Mar. 1952	Feb. 1952	Jan. 1952
Natural Gas Transmission Companies	4.04%	4.14%	4.48%	4.44%	4.10%	4.01%	3.98%	4.05%	4.08%	4.03%	4.36%	4.32%
Natural Gas Transmission & Distribution Companies	4.99	5.14	5.47	5.45	5.30	5.26	5.28	5.32	5.34	5.14	5.29	5.17
Manufactured & Mixed Gas Companies	4.83	5.00	5.04	4.80	4.70	4.89	4.84	5.06	5.13	4.99	5.18	5.05
Class "A" Electric Companies	5.10	5.20	5.40	5.39	5.40	5.49	5.60	5.54	5.65	5.51	5.61	5.53
Class "B" Electric Companies	5.08	5.19	5.47	5.42	5.46	5.51	5.55	5.57	5.61	5.48	5.70	5.64

This is a straight arithmetical index of comparative yields obtainable on a selected group of gas and electric utility industry common stocks.

The companies comprising this index have been selected by the AMERICAN GAS JOURNAL as providing a representative cross-section of each industry, from the standpoint of geographical diversification and of the relative importance of the individual companies in their areas.

No effort has been made to weight the average to give effect to changes in capitalization or in dividend rates because the yields afforded on the issues reflect such changes. The index is designed to show the rate of return and not necessarily market movements on the stocks comprising it.

This index is compiled from: natural gas transmission companies, 5; natural gas transmission and distribution companies, 5; manufactured and mixed gas companies, 4; class "A" electric companies, 4; class "B" electric companies, 5.

Familiarity with Rate Problems Held Desirable

(Continued from page 20)

Court decision of West Ohio Gas Company v. Public Utilities Commission, 294 U. S. 63.

An important point of law is that before a court will render its decision involving the validity of a gas rate established by a public service commission, it will review *both* the law applied by the commission, and the evidence introduced during the hearing to ascertain whether the order of the commission is unlawful and reasonable. See Public Utilities Commission, 120 N. E. 330; and Clairsville v. Public Utilities Commission, 132 N. E. 151.

If the decision rendered by the commission is manifestly against the weight of the evidence, and in violation to a valid law, its decisions will be reversed. See Settle v. Public Utilities Commission, 114 N. E. 1036.

When determining whether a rate is confiscatory and invalid, the court will carefully examine the evidence and exercise its independent judgment, without influence of the public service commission. See United States Supreme Court decisions, as follows: Ohio Valley v. Ben Avon Borough, 253 U. S. 287; Utilities v. Public Utilities Commission, 267 U. S. 359.

City sells gas appliances

"Can a city, which supplies gas to the inhabitants lawfully sell gas appliances and accessories to its consumers where no state law expressly gives the city this authority?"

A city has "implied" powers to sell gas appliances, according to a late higher court decision, irrespective of state laws which may not expressly give such authority.

A municipal corporation was created in the usual manner by the laws of the state. The municipality is empowered by these state laws to engage in the business of selling and supplying the inhabitants of the city with gas, and the state laws do not specifically or expressly authorize municipalities to sell gas appliances, yet the city for many years has been engaged in the sale of retail of gas ranges, gas stoves, gas heaters, mechanical refrigerators and other household appliances.

Suit was filed against the municipality on the contention that the state laws must be interpreted in strict accordance with their terms which do not expressly authorize municipalities to engage in the business of selling gas appliances. Nelson-Johnston & Doudna v. Metropolitan Utilities Dist., 291 N. W. 559.

It was further alleged that the city should not be permitted to sell gas appliances because there are numerous private mercantile establishments engaged in the gas appliance business in the city. It was contended that the municipal corporation is unlawfully engaging in the gas appliance business contrary to the expressed state laws.

Municipality may sell appliances

The higher court held that the municipality has *implied* powers to engage in the business of advertising, selling and installing gas appliances and equipment.

"The defendant is a municipal corporation created by statute to take over, control and operate the gas system of the city of Omaha, and other public utilities . . . ," the court said. "The grant of power to control and operate a public utility necessarily implies all the incidental powers to do anything that any business man or corporation ought to do in operating a successful business enterprise. Certainly, a private corporation engaged in the manufacture and distribution of gas may sell gas appliances to the purchasing public. The sale of such appliances by private utility companies tends to increase the volume of gas sales and thereby increases the economic efficiency of the corporation."

Therefore, it is quite apparent that although the state laws do not expressly authorize municipal corporations to engage in the business of selling gas appliances, yet if a municipal corporation legally acquires a gas plant, with the right to operate it for the benefit of its inhabitants, it acquires by implication the right to do all the things that a private gas company might do in order to economically and efficiently furnish gas to the citizens.

What is fair return?

Not so long ago an executive of a large gas company was considerably confused regarding what the higher courts consider a "fair return" of invested capital. He asked for leading higher court citations in order to thoroughly understand the law on this subject.

According to a leading higher court five per cent return on the investment of a public utility is fair and reasonable.

In the case of Safe Corporation v. Federal Power Commission, 179 Fed. (2d), the Federal court upheld the Commission's decision that five per cent return on the corporation's investment is fair and non-confiscatory.

"Is the rate of return of five per cent found by the Commission a 'fair return?' This question is indeed the important one. Categorically stated that answer is 'yes' . . . ," the court said.

For comparison, see Bluefield Improvement Company v. Public Service Commission, 262 U. S. 693. The Supreme Court of the United States said, "The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties."

Customer disconnected appliance

"If a gas company neglects to provide adequate valves on its main gas lines to stop the flow of gas, is the gas company liable for explosions of gas caused by a property owner disconnecting a gas appliance?"

The answer is no, if negligence of the property owner or his agent is the direct cause of the explosion.

In Henrik v. Herrin Transfer and Warehouse Company, Inc., 43 So. (2d) 471, the testimony showed that Mrs. Henrik sold her residence and, in order to give possession to the purchaser, she arranged with a warehouse company to remove from the premises her furnishings and household goods, and to store them in its warehouse.

The warehouse company sent three employees to the residence. A kitchen range was still connected with the gas line. There was no master valve on the main supply line by which the flow of gas could be stopped. Mrs. Henrik asked one of the moving men to disconnect the stove. He did so at her request, although he was not thoroughly experienced in disconnecting gas appliances. Following the disconnection of the stove escaping gas became ignited, and the house and its contents burned.

Gas company or customer liable?

In subsequent litigation it was contended that the gas company was liable because of its negligence to have a master valve on its supply line so that the main flow of gas could be cut off. However, since Mrs. Henrik had directed the warehouse employee to disconnect the stove, the higher court decided that negligence of her agent was the direct cause of the explosion which placed the liability and responsibility directly on her.

The higher court held that although there was no master valve on the main gas supply line neither the gas company nor the warehouse company was liable in damages for the explosion.

"The testimony shows clearly that she (Henrik), as an active participant in the dangerous operation undertaken by defendant's employees aided in causing the fire and its resulting damage," the court said. "Plaintiff (Henrik) encouraged the procedure resorted to."

Common Stock Money Seen as Competitive Consideration

(Continued from page 27)

Close observers of the government bond market believe that such financing would result in a situation where the 20-year issues should sell on a 2.75 per cent basis, ten-year issues on a 2.50 per cent basis, 5-year issues to yield 2.35 per cent and bills to yield two per cent. It so happens, they note, that the above issues currently are selling within a few basis points of the yields set forth, the import being that the government bond market has been readied for a long-term three per cent bond without any disturbance to the present outstanding issues.

The impact on the corporate bond market, however, could be terrific. Currently, 30-year corporate bonds are yielding some 40 basis points more than 20-year Treasuries. While this spread appears appropriate now, it would be completely askew if a three per cent government bond were created. In such event, the corporate bond yield is expected to move almost at once from a 3.15 per cent to 3.40 per cent yield basis. Translated into terms of principal, it would represent a market loss of almost five points.

A development of this sort naturally cannot be predicted unequivocally. But the probability is too great not to be recognized and acted upon.

In brief, too-long delay in arranging needed new debt financing might subject the utility to greater capital cost than it has been anticipating.

Polls taken recently of business men and economists show that only a very small percentage of those questioned expects any let-down in industrial activity over the next year. The slight fears entertained on this score, furthermore, are limited to closing months of the year and to the belief that any reaction will be minute.

Even the economists of the United States Chamber of Commerce are on record as predicting that the present prosperous conditions will last through 1953, unless there are *major* developments in foreign affairs.

Even if there is peace in Korea, they state, no major recession looms.

As all followers of the financial and business scene know, there is danger in unanimity of opinion. More often than not, developments go in the exactly opposite direction than is expected. It might be said, however, that there does not loom on the horizon, *at the moment*, any development which threatens to disturb the equanimity with which most observers view the outlook—now that the "Missouri Mule" is on his way home.

The commercial departments of the utilities should bear in mind, though, the sharp rise which has occurred of late in the volume of instalment debt. Following the ending of Regulation W, last Spring, a strong new upsurge developed in consumer instalment borrowing. Total instalment debt jumped 16 per cent between April 1 and the end of September, a rise of $2 billion in six months. This gain contrasts sharply with the similar period of 1951 when such debt rose only $200 million, and is only slightly less than during the comparable months of 1950 which included the first post-Korean wave of scare buying.

The rise in instalment debt has been one of the largest gains ever experienced in so short a period. Renewal of the upward movement in this respect is cause for serious concern that people are assuming too heavy a debt burden in relation to their income, financial resources and stability of employment. The postwar rate of growth in consumer instalment credit has far surpassed that of any other type of debt. Total instalment debt has increased from less than $2.5 billion at the end of 1945 to about $15.5 billion at present.

The rapid expansion in debt this year evidences a growing reliance on credit buying to maintain sales. This may mean that the demand for consumer durables is becoming increasingly vulnerable to a downturn in business activity. Should employment and income decline, instalment credit extensions might well drop sharply.

Although the business outlook now is not such as to generate grave fears about the safety of instalment debt, the dangers inherent in the size of such indebtedness is something for the credit department of the utility to keep in mind. To be forewarned is to be forearmed.

Testing and Records Help Determine Odorization Rate

(Continued from page 21)

All odorizers can be checked quite easily and should be checked frequently.

Odor intensity in different parts of a system can be easily determined and this is necessary, particularly in the larger systems.

New pipe installations extract some odor from the gas until the pipe interior becomes saturated. Does this take two days or two weeks or two months? This is important where new piping is installed for new areas.

How much "fly wheel" effect is there in an odorized piping system? If the odor supply accidently shut off, what time element exists before the gas odor has changed radically?

More exact information can be obtained on the loss of odor as gas passes through various kinds of soil.

What effects can be observed in the masking of gas odor by the atmosphere in a damp, musty or smelly basement?

If odorized gas is purchased, an odor specification and tests are certainly in order.

Comparison of the effectiveness of different odorants can be determined.

Records are recommended

For proper supervision some odor records should be kept.

1. A record should be kept of quantity of odor used by day or by week or by unit volume of gas. Figures for such records are sometimes only approximate.
2. Odor tests should be made and recorded daily at some representative location in the distribution system. Such tests can be made in less than five minutes.
3. Records should show a schedule of odor tests made at outlying areas of the system.
4. For satisfaction and for legal protection, records should show odor tests made as quickly as possible at the location or in its immediate vicinity where some damage from a gas mishap has occurred.
5. Show on daily log sheets the date and location of test, test results and special reasons for making the test, and quantities of odorant used.

Adapted from a presentation to Wisconsin Utilities Association 1952 Convention

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News of the Gas Industry

Joseph Becker Retires from Koppers

After nearly fifty years of service to industry, Joseph Becker retired at the close of last year from his position of vice president and general manager, engineering and construction division, Koppers Company, Inc. He will remain as a consultant to Koppers and, through that company, as a consultant to the nation's steel industry.

Joseph Becker

Mr. Becker was born in Essen, Germany, in 1887, and he went to work immediately after completing the equivalent of a grammar school education. After a year as a clerk in a law office, he went to work in a coke plant, assigned to routine work in a laboratory. He attracted the attention of Heinrich Koppers, builder of the coke ovens. Koppers offered him a job, after which Mr. Becker studied chemistry at night.

In 1910, Koppers had been asked to build a battery of chemical-recovery coke ovens in the United States and selected Mr. Becker as chief chemist to operate from Joliet, Ill. This temporary assignment proved to be permanent.

A Pittsburgh group bought the Koppers' American interests in 1914 and Mr. Becker remained, first as consultant and then in the various positions that led to the one he relinquished upon retirement. During more than forty years in the United States, Mr. Becker has obtained 97 patents.

New AGA Exec Committee Appointed

A new executive committee, comprised of nine officers and directors of American Gas Association, has been appointed for the coming year. The committee has all the authority with respect to the properties, funds, finances and activities of AGA that is vested in the Association's board of directors. It functions between meetings of the full board.

Members appointed to the executive committee are: Frank C. Smith, president, Houston Natural Gas Corp., AGA president; Earl H. Eacker, president, Boston Consolidated Gas Co., AGA vice-president; F. M. Banks, president, Southern California Gas Co., AGA vice-president; Edward F. Barrett, president, Long Island Lighting Co., AGA treasurer; Charles E. Bennett, president, The Manufacturers Light & Heat Co., AGA past-president; Lyle C. Harvey, president, Affiliated Gas Equipment, Inc., treasurer, Gas Appliance Manufacturers Association; J. F. Merriam, president, Northern Natural Gas Co.; Dean H. Mitchell, president, Northern Indiana Public Service Co.; and J. Theodore Wolfe, executive vice-president, Consolidated Gas Electric Light and Power Company of Baltimore.

Mfrs L&H Co Realigns Top Execs

The board of directors of The Manufacturers Light and Heat Company and affiliated Pittsburgh Group Companies of The Columbia Gas System has advanced the three top executive officers, each having had long experience in the system.

Charles E. Bennett

Charles E. Bennett, president, was elected chairman of the board. Mr. Bennett is the immediate past president of American Gas Association. President of the Pittsburgh Group Companies since 1935, he is a veteran of 37 years in the gas business and has held executive positions in Columbia Gas System since 1930.

John C. Peterson, vice president and general manager, was advanced to president. He has been with the Pittsburgh Group since 1930. Advanced to assistant secretary in 1940, Mr. Peterson was named secretary in 1945 and elected vice president, secretary and general counsel in 1948. He has been vice president and general manager since January, 1952.

John C. Peterson

Fred W. Batten

Fred W. Batten, vice president and assistant general manager, was advanced to vice president and general manager. He started as an engineer with Columbia's Binghamton companies in 1936. Later appointed an assistant vice president of Columbia Gas System Service Corporation, he has been vice president and assistant general manager of the Pittsburgh Group since September 1951.

R. G. Rice is ExecVP of TGTCo

The board of directors of Tennessee Gas Transmission Company elected R. G. Rice to the position of executive vice president at the most recent meeting. Mr. Rice has been with TGT since it was formed in 1943 and has been a vice president since 1945. During the past year, he was a senior vice president. Also, Mr. Rice serves as president, Tennessee Production Company, the oil and gas exploration and production affiliate of TGT.

HUGE PIPE EXPANSION NEEDED FOR THREE-YEAR GAS DEMAND

Petroleum Administration for Defense has reported that if the Nation's natural gas utilities are to carry out the planned expansions to meet the potential demand by the Winter of 1955-56, they must lay almost ten million tons of pipe in the next three years.

PAD made public a survey among utilities and said that the returns indicate the natural gas supply will be sufficient on peak days this winter if the weather is normally cold.

Peak day demands, PAD said, of all potential natural gas customers are expected to increase by the Winter of 1955-56 to 38-billion cubic feet, up 50 per cent over the 1951-52 peak day requirement of 25.3-billion cubic feet.

J. Ed Warren, deputy petroleum administrator, said that "it is obvious from the figures that until the industry gets sufficient pipeline capacity and increases its underground storage and other devices, it will have to put up with a control of the growth of its market in some areas."

He expressed the belief that the date "is not too far in the future" when the PAD can remove its restriction on the addition of new space heating and industrial customers in certain areas, but said it would then be up to the industry to cooperate closely with state regulatory bodies in insuring curbs against a possible runaway gas market.

Reports indicated supplies for the Appalachian-Middle Atlantic and Upper Great Lakes areas would fall substantially short of potential demand in the Winter of 1955-56 and that additional facilities will be needed for those areas.

Rockland Gas Sold to Rockland L&PCo

Rockland Light and Power Company, Nyack, N. Y., has purchased the adjoining Rockland Gas Co., Inc., Spring Valley, N. Y., according to Fremont L. Lovett, president of the power company. The acquisition, effective Dec. 31, added 14,000 gas customers for a new total of 26,500 served by Rockland Light and Power. Both companies have distributed natural gas since 1935.

Charles L. Hulswit

Charles L. Hulswit, president of Rockland Gas Co., for the past fifteen years, becomes vice president and director of Rockland Light and Power. Under his management, the gas company expanded from 1,800 customers; gas sales increased more than 8,000 per cent. Regular Rockland Gas employees become employees of the power company.

In the transfer of ownership, Rockland Gas stockholders will receive shares of Rockland Light and Power Company on a 4-for-1 share basis.

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AGA Seeks Broad Industry Support for Expanded Public Relations Program

After more than a year of deliberation and planning, a special public relations committee of the American Gas Association has completed its report and compiled recommendations for an industry public relations program to be operated under policy supervision of the AGA board of directors. A complete presentation of the plan is now in preparation with literature describing the details of its proposed operation, and soliciting financial support, to be mailed to all member utilities of AGA at an early date. The activity will not be financed out of Association membership dues.

A tentative budget has been set up on the basis of the first three years of operation, contemplating an expenditure of $155,000 the first year, $255,000 the second year and $355,000 the third year. The public relations fund will be accumulated on a voluntary assessment plan, based on a percentage of dollar-revenue from sales of gas to ultimate customers by the operating utilities, and on a graduated scale based on gross revenue for the pipeline companies. In its report to the board of directors of AGA, the committee advised that, to be started, the program will require support by companies representing a total of at least 60 per cent of gas industry revenue from ultimate consumers.

The proposed plan is designed to function to a considerable extent at the local utility level, with AGA feeding out suggested programs and rendering assistance on local problems, the while relying on the publicity and public relations departments of the member companies to establish and maintain their own channels of dissemination to customers, stockholders, employees and newspapers. On a national level, the Association will originate and conduct a program aimed at influencing opinion-forming groups and national media, such as publications and press services, radio, other industries and associations.

The report summarizes the program of action under nine specific points, which will be developed gradually as the activity gains momentum, and as the necessary staff and operational techniques are developed. In summary, the objectives of the nine points will be to:

1. Determine and evaluate public attitudes toward the gas industry,
2. Stimulate local public relations activity,
3. Provide an information service for local application by participating companies,
4. Inform employees on the economics of the gas industry and the free enterprise system,
5. Educate the public on the economics and financial needs of the gas utilities in the interests of good service,
6. Encourage investment in gas industry securities,
7. Promote gas as an ideal fuel,
8. Provide factual information to educational institutions,
9. Oppose encroachment of government on the field of private enterprise.

In rendering its report and recommendations to the industry, the committee points out that spheres of activity covered by the initial conception of the program are subject to revision in the light of future experience, and upon the recommendations of the participating companies.

The new program, if approved and adequately financed by the industry at large, will supersede the present AGA public information activity that has been operating on a limited budget of $55,000 a year, sending out factual press releases, largely to newspapers and national magazines, with special emphasis on the financial aspects of utility investment securities.

The public relations committee, originally appointed in August 1951 by the then-president of AGA, D. A. Hulcy, and maintained through the administrations of the late George F. Mitchell and C. E. Bennett, consists of:

Ernest R. Acker, *chairman*, president, Central Hudson Gas & Electric Corp.; F. M. Banks, president, Southern California Gas Company; F. D. Campbell, president, New England Gas and Electric Association; E. S. Fields, vice president-general manager, The Cincinnati Gas & Electric Co.; W. H. Ligon, president, Nashville Gas Company; Remick McDowell, vice president-secretary, The Peoples Gas Light and Coke Co.; Chester L. May, vice president, Lone Star Gas Co.; F. T. Parks, vice president, Public Service Company of Colorado; Claude A. Williams, president, Transcontinental Gas Pipe Line Corporation; and John W. West, Jr., *secretary*, assistant managing director, AGA.

COMMEMORATING BROOKLYN BOROUGH GAS COMPANY'S 100,000 METERS

In commemoration of the installation of its 100,000th meter, Brooklyn Borough Gas Company was presented with a gold meter by American Meter Company. Here, Mr. C. B. Dusnane, Jr., vice president, sales, American Meter Company, is making the presentation to Mr. Walter M. Jeffords, Jr., president, Brooklyn Borough Gas Company.

NORTHERN NATURAL HOLDS WELL SALE NOT VIOLATION OF FPC ORDERS

Northern Natural Gas Co. contended early this month that it had not violated Federal Power Commission orders in selling its gas wells and leases to a subsidiary. FPC had granted the company authority to expand its daily capacity from 600 to 825 million cubic feet on condition that the company would not dispose of its gas reserves without securing FPC-approval.

Northern sold its wells and leases to a new subsidiary, Northern Natural Gas Producing Co., but through a gas purchase contract retained rights to all gas produced in the wells.

Justin Wolf, attorney for Northern Natural, before the full Commission, urged dismissal of the proceeding against the company. The Commission directed the company to show that it had not violated FPC orders. Mr. Wolf claimed that in disposing of the wells and leases to the subsidiary, Northern Natural has not lost control of the gas reserves.

A representative of Council Bluffs Gas Co., urged FPC to find that Northern had violated the order.

A representative of Minneapolis Gas Company agreed. He said the Commission could apply for a writ of mandamus ordering Northern to carry out the FPC order. In this way, he said, Northern's utility customers and householders using natural gas would not suffer during the legal proceedings.

Northern's gas reserves are just as firmly committed to the expansion program now as before the sale of the leases, according to a representative of Iowa Power and Light Co.

Revocation of Northern's certificate would not be in the public interest, the Commission was told by a representative of Central Gas and Electric Co. He said the Commission has other ways to enforce its orders.

The representative of Omaha Metropolitan Utility District was concerned about the type of penalty the Commission might impose on Northern if it determined its order had been violated.

Ohio Fuel Gas in $25-million Expansion

Ohio Fuel Gas Co. has announced plans for a $25,000,000 expansion program this year. During 1952 the company invested $21,000,000 in new pipelines and other facilities, bringing its six-year construction expenditures to more than $100,000,000. In outlining the 1953 program, Allan W. Lundstrom, president, said the company, a Columbia Gas System affiliate, will continue to seek more gas from transmission companies. Since 1946, Ohio Fuel Gas has increased its annual gas deliveries by 93 per cent and extended gas service to 94,000 new customers.

2 Gas Act Amendments Proposed

Two bills proposing amendments to the Natural Gas Act presented to broaden the jurisdiction of the Federal Power Commission were presented in the House on the first day that the new Congress met, by Representative Heselton (R) of Massachusetts.

The bills were referred to the House Committee on Interstate and Foreign Commerce, of which Representative Heselton is a member.

H. R. 133—To amend the Act with respect to the duty of FPC to report to Congress regarding the effect and operation of state compacts dealing with conservation, production, transportation, or distribution.

H. R. 134—To authorize FPC to prescribe safety requirements for natural gas companies.

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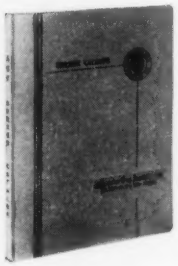

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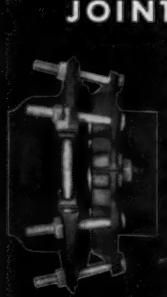
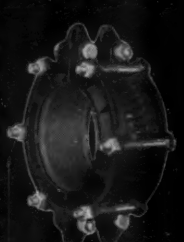
FOR REPAIRING BELL AND SPIGOT JOINT LEAKS...



SKINNER-SEAL Bell Joint Clamp for stopping bell and spigot joint leaks under pressure. Gasket is completely sealed: at bell face by Monel Metal Seal band—at spigot by hard vulcanized gasket tip.

AND BROKEN MAINS

SKINNER-SEAL Split Coupling Clamp. One man can install in 5 to 15 minutes. Gasket sealed by Monel band. Tested to 800 lbs. line pressure. A lasting repair. 2" to 16" incl.



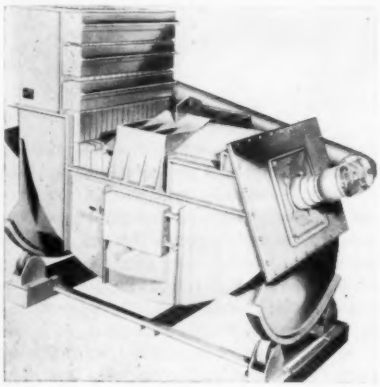
M. B. SKINNER CO.
SOUTH BEND 21, INDIANA, U.S.A.

NEW EQUIPMENT

INDUSTRIAL PROCESSING EQUIPMENT

Reverberatory metal melting furnace

This new furnace for continuous-charge and continuous-pour operation in metal casting is applicable to ferrous and non-



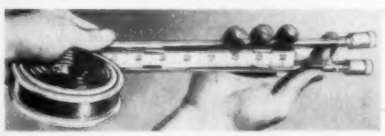
ferrous metals. It is described as a non-crucible, direct-fired reverberatory furnace. The manufacturer states that no time is lost between pouring and recharging; hot metal is always available for casting. The hopper in which the metal is charged has a restricted opening at the bottom to prevent contact between molten metal and cold metal. This furnace is said to be equally efficient for large or small heats and can be built to meet specified requirements. Standard models for bath capacities range from 300 to 4,400 pounds.

Eclipse Sklenar Reverberatory Furnace. Eclipse Fuel Engineering Co., Rockford, Illinois.

GAS UTILITY OPERATING EQUIPMENT

Flexible slack-tube manometer

A new and improved slack-tube manometer is equipped with a convexed spring-steel scale for both rigidity in use and flexi-



bility in carrying. This device rolls into a small unit that will fit a pocket or service kit. The body is made of durable vinyl plastic. It can be rolled, twisted or bent into any necessary shape and will return to its original shape. The spring steel scale is held firmly and yet may be moved forth and back for zero-adjustment. This device is available in standard ranges from 8" to 10', in either water or mercury.

Series 1211 Manometer. F. W. Dwyer Manufacturing Co., 317 S. Western Ave., Chicago 12.

GAS UTILITY OPERATING EQUIPMENT

Repair clamps, stainless steel-coated

The malleable iron casings in this manufacturer's line of pipe repair clamps are now furnished with two coats of powdered stainless steel in plastic suspension to provide greater protection against corrosion. The bands are of stainless steel. These repair clamps are said to provide a positive and permanent repair for leaks, blowouts or short splits in all types of pipe. This clamp line uses a slotted lug which enables the user to drop the bolt through the slot and tighten without a separate nut. The clamps are available for pipe sizes from ½" to 24" and in standard widths of 3", 6", 9" and 12". Larger widths are available.

Stauffer Pipe Repair Clamps. Adams Pipe Repair Products, El Monte, Cal.

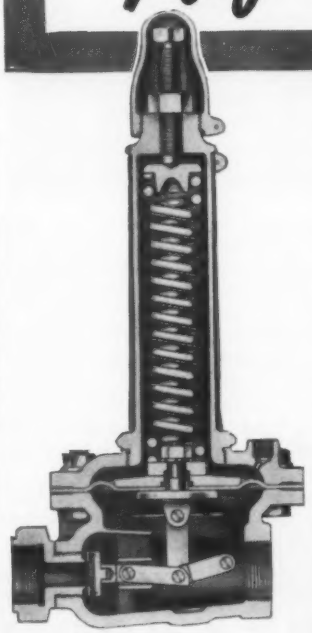
INDUSTRIAL PROCESSING EQUIPMENT

Dual fuel burner

This new closed-flame, dual fuel, gas-oil burner is a blast burner that may be used with any gas or fuel oil for firing industrial furnaces, ovens or other processing equipment operating in the range between 200° and 2,400°F. The manufacturer states that the burner has proved to have excellent flame retention, mixing qualities for gas and a high atomizing efficiency for oil. The nozzle mixing principle employed incorporates a dual-atomizing tip. Secondary air meets the gas or oil mixture in both a converging and rotating pattern to promote atomizing efficiency at the nozzle exit. A rotating main combustion air casting permits adjustments for any desired alignment of piping. A high discharge capacity and low turn-down range are claimed.

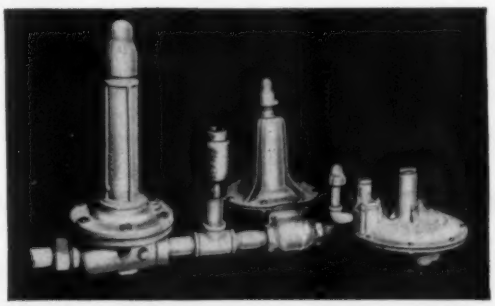
Dual Fuel Burner. Eclipse Fuel Engineering Co., Rockford, Ill.

IN THE HIGH PRESSURE FIELD
THERE IS SAFETY
IN *Reynolds* ...



Accurate, Safe Control

of tremendous pressures is an ever present problem in the gas field. Reynolds field Regulator illustrated at left is one of the many high pressure regulators built by Reynolds. It is thoroughly tested and proved in service. It handles up to 1,000 pounds safely reducing same to pounds. For more than fifty-five years Reynolds has designed and built gas regulators. Safety, accurate performance, years of service—these are some of the built-in factors responsible for Reynolds enviable position in the Gas Control Field.



Reynolds Gas Regulator Co.
ANDERSON, INDIANA, U. S. A.
GAS CONTROL SINCE 1892

INDUSTRIAL PROCESSING EQUIPMENT

Flame failure safeguard

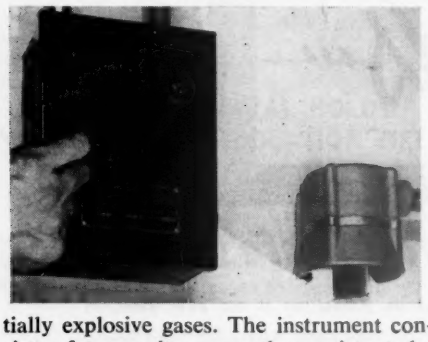
This protection against flame failure in combustion equipment is of the scanner type and is said to provide instantaneous burner shut-down in event of flame failure. This device is a photoconductive cell that is highly responsive to infrared and is coupled to electronic circuits. It distinguishes between infrared from a flame and infrared from other sources. The cell is approximately the size of a pencil eraser and is plugged into the scanner unit which is connected by cable to electrical connections. The single scanner views both pilot and main flames. The device has been approved by Underwriters' Laboratories and Factory Mutual Laboratories.

Firetron Flame Failure Safeguard. Combustion Control Corp., 720 Beacon St., Boston 15.

INDUSTRIAL PROCESSING EQUIPMENT

Explosive-gas alarm

This combustible gas alarm is described as having a wide range of application in maintaining a continuous check for poten-



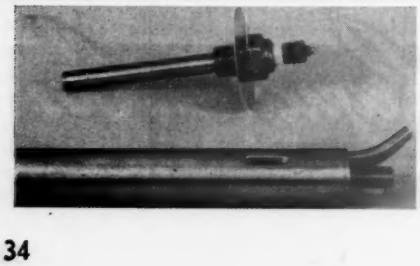
tially explosive gases. The instrument consists of two units: a weather resistant detector and a control box for remote location mounting. The manufacturer states that the instrument operates by diffusion and convection. The flashback-proof detector senses the presence of combustible gas. At 0.2 per cent of the lower explosive level, a red indicator light is energized on the control box panel. As the hazard is removed, the light is shut off. The instrument operates from standard 115 volt electricity and features an all-electronic alarm circuit without meters, meter-type relays and other delicate mechanisms. Terminals are provided in the control box for actuating auxiliary audible alarms, controlling motors or valves or connecting repeater signals for distant points. The assemblies are designed for convenient maintenance.

J-W Combustible Gas Alarm. Johnson-Williams, Ltd., 2669 Third St., Palo Alto, Cal.

INDUSTRIAL PROCESSING EQUIPMENT

Midget thermostat and switch

Precise detection of overheating, in limited space, is said to be entirely practical



with this newly redesigned thermoswitch which has a heat-sensitive shell with an outside diameter of ¼". Intended specifically for applications in which temperature control or overheat detection is critical, the instrument may be applied to the heating of solids, liquids or gases. The midget thermostat is adjusted and sealed at the factory to any temperature point in the range from *minus* 50° to 450°F and has an inherent sensitivity of 0.1°F. In the accompanying illustration the midget device is compared with a standard device which has a shell diameter of ⅝". The midget unit has such operating characteristics as built-in temperature anticipation, fast reaction time, resistance to vibration and shock, and short heat transfer path.

Fenwal Midget Thermoswitch. Fenwal, Inc., Ashland, Mass.

INDUSTRIAL PROCESSING EQUIPMENT

Recirculating valve

This recirculating valve is designed for use in any stream that divides fluids, operating at a maximum of 125 psi. The de-

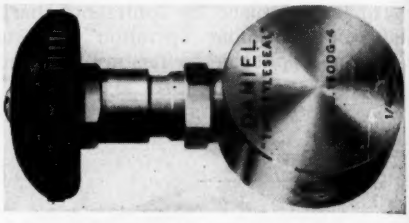
sign incorporates a combination of valve principles and O-ring sealing. It is claimed that a positive leakproof condition is obtained and that both handle-loads and internal wear are reduced to a minimum by the application of an externally adjustable spring seating control that features multiple ball pressure contact against a hardened wear ring. The valve is available in cast aluminum, steel or Navy bronze. The bronze and steel valves are cadmium plated throughout.

Ardee Recirculating Valve. Ardee Manufacturing Co., 840 N. Seward St., Los Angeles 38.

INDUSTRIAL PROCESSING EQUIPMENT

Globe or angle valve

This new valve is said to incorporate radical changes in design and operation, using O-rings for bubble-tight shut-off. The



valve is equipped with a throttle plug-spindle feature and a micro-adjusting rising stem which controls the ratio of the flow from full open to less than 1 per cent of the effective flow area through the port. The O-rings are said to be fully protected against blow-off at all rated line velocities. The metal seat shield is an independent part and will not revolve when in contact with the seat in the valve body, thereby eliminating galling. This shield fully encloses and protects the O-rings. The valve is available in ¼" and ½" sizes, either globe or angle. It is made of stainless steel and is designed for operation with any fluid. Rated at 3,000 psig, the temperature limits are from 40° to 225°F plus.

Daniel Throttleseal Valve. Daniel Orifice Fitting Co., Los Angeles 23.

NEW BULLETINS

CUT-OFF RELAY. The relay that is the subject of this bulletin is used in conjunction with electric controllers on applications that require automatic shut-down and manual reset, after a predetermined control point has been reached. The control of excessive temperatures or pressures and high or low limits can be obtained through this instrument in conjunction with other processing equipment, the bulletin states.

Bulletin 8504. Pp. 2. Station 64, Minneapolis-Honeywell Regulator Co., Philadelphia 44.

PNEUMATIC BUTTERFLY CONTROL VALVES. The valves described in this bulletin are designed to regulate the control of air, gas, liquids, or steam and are said to give a

THE GOODMAN STOPPER

GOODMAN — USED SINCE 1897 — "Z" HANDLE & LOCKING SLEEVE — GAS MAIN STOPPER

Now has the "Z" handle for easy manipulation. When locked in place it holds. Stopper cannot slip. Gas cannot pass. Adjusted in 30 seconds.

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Nearly a half century of service to the Gas Industry.

The Reliable Shut-Off for Street Mains

Safety Gas Main Stopper Co.

523 Atlantic Avenue, Brooklyn, New York

higher capacity than globe valves of the same size. They are designed to present a minimum restriction to the flowing fluid. These valves are for use in conjunction with indicating, recording or non-indicating pneumatic controllers. The complete assembly consists of a valve body, linkage and pneumatic motor. The principal construction is of bronze and it is available in a range of sizes between 1½" and 6". The wing rotation is 68°.

Bulletin 8503. Pp. 4. Station 64, Minneapolis-Honeywell Regulator Co., Philadelphia 44.

BROWN BTU METER. This bulletin describes a system for simultaneously recording differential temperature and the flow of a liquid, providing direct Btu readings. It can be employed in any application where a liquid is used as a heating or cooling agent. The instrument is designed for panel mounting. The manufacturer states that it can be employed to advantage wherever it is necessary to measure the number of heat units per unit of time, either dissipated or absorbed.

Bulletin 10.19-1. Pp. 2. Station 62, Minneapolis-Honeywell Regulator Co., Philadelphia 44.

INSTRUMENTAL AIR PRESSURE REGULATORS AND CONSTANT PRESSURE DIFFERENTIAL REGULATORS. These instruments are designed for use together with industrial processing equipment, regulating air pressure to pneumatic instruments and supplying constant flow rate of air supply to purge lines and pneumatic liquid level and density measurement. The bulletin is fully descriptive and illustrated with appropriate charts and tables.

Bulletin 29. Pp. 8. Fischer & Porter Co., Hatboro, Pa.

ECLIPSE VARI-SET PROPORTIONAL MIXER WITH ADJUSTABLE JET. Described as simplifying heating changes or combustion equipment, this mixer has a built-in, adjustable air jet and venturi throat that is said to give a wide range of gas capacities. Adjustment of the mixer is designed to permit using it with any burner capacity within its range, with all commercial fuel gases. The bulletin includes complete description and illustration together with capacity chart, dimensional and specification drawings and tables.

Bulletin L-700. Pp. 4. Eclipse Fuel Engineering Co., Rockford, Ill.

MULTIPLE BURNER PROTECTOGLO SYSTEMS. The systems described in this bulletin provide combustion safeguards for multiple gas burner installations. They are used in connection with industrial heating applications. All releases, signal lights, push-button stations and other control equipment are enclosed in a single cabinet for standard systems, providing for two to sixteen burners. The bulletin includes complete description and illustration with schematic presentation of the systems.

Bulletin 9603. Pp. 4. Station 213, Minneapolis-Honeywell Regulator Co., Philadelphia 44.

CLEVELAND BABY DIGGER—MODEL 95. This utility trencher is described fully in a new bulletin which includes complete descriptions, highlighted illustrations, application photos and dimensional capacity tables.

Bulletin 95. Pp. 8. Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland 17.

SPIRAXIAL COMPRESSORS. A completely informative and descriptive bulletin covering the compressor that was shown on page 37 of the December issue of AMERICAN GAS JOURNAL is now available. All the features of this new design are included and the bulletin illustrates adequately the potentials of the compressor for gas utility applications.

Bulletin SC-152. Pp. 4. Roots-Connersville Blower, Dresser Industries, Inc., Connersville, Indiana.

BARCO GASOLINE HAMMER. A gasoline-powered hammer that is applicable to utility operation is described, illustrated and specified in this new bulletin. Four models are available, for varying job characteristics. Each is described separately. According to the bulletin, this hammer is applicable to pavement breaking, ramming, drilling and other typical utility work.

Bulletin 613. Pp. 8. Barco Manufacturing Co., 1801 Winnemac Ave., Chicago 40.

INSULATING METER NUTS AND PIPE UNIONS. These insulated nuts and unions are designed to eliminate stray electrical currents that cause corrosion or other deterioration of gas pipes. The devices were described on page 48 of the July issue of

M-SCOPE Pipe Finder

LIGHTWEIGHT MODEL

One Man Operation On Every Application

HIGHLY EFFICIENT

IMMEDIATE SHIPMENT

Free Demonstration and Operating Instructions

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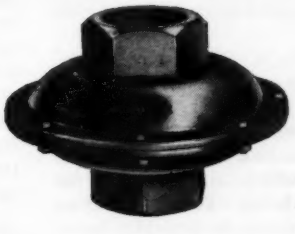


VERTICAL TYPE SHOWN

Eliminate Air In Gas Lines With

NORWALK DIAPHRAGM TYPE CHECK VALVES

Vertical Type in Sizes ⅜" thru 6"

Horizontal Type in Sizes ½" thru 6"

Norwalk Diaphragm Type Check Valves, both Vertical and Horizontal, provide positive check against reverse flow of either gas or air. Rugged construction will stand back pressures to 50 lbs. Soft seat disc will seat freely when gas flows in desired direction or will seat tightly on equalised or back pressure. Valves for higher pressures supplied on special order.

NORWALK VALVE COMPANY

South Norwalk, Conn.

AMERICAN GAS JOURNAL. Four types of insulation are available: meter nuts for iron case meters, for tin meter bars, a universal insulating union and an insulating nut applied to universal service regulators. The bulletin is illustrated in a readily-understandable manner and specification tables are included.

Bulletin 522. Pp. 4. Universal Controls Corp., 731 West Davis Street, Dallas 8.

CONTINUOUS, INTENSITY-CONTROLLED RAPPING FOR COTTRELL ELECTROSTATIC PRECIPITATORS. Illustrated information on the recent development of magnetic impulse electrode rapping system for electrostatic precipitators is included in this bulletin. The rapping system provides for continuous, self-motoring electrode cleaning, that improves overall precipitator efficiency and is said to reduce operating costs. Diagrams and photographs are included to explain the operation of the system.

Bulletin MI. Pp. 6. Research Corp., Bound Brook, N. J.

PLASTIC PIPE. A complete line of plastic pipe and fittings is described in this new bulletin with adequate information about its physical properties, dimensions and data. Chemical resistance ratings also are included. The pipe is available as flexible, semi-rigid, high impact and rigid. Applications to gas service entrance lines are discussed and illustrated. Methods of installation are shown.

Pp. 16. Triangle Conduit & Cable Co., Inc., Plastic Products Div., New Brunswick, N. J.

PRECISION BORED METER RUNS. This bulletin describes the manufacturer's precision bored tools to be used in connection with flowmeter orifices.

Bulletin 1701. Pp. 4. Dravo Corp., Machinery Div., Pittsburgh 22, Pa.

ALUMINUM MELTING FURNACES. This new bulletin describes a line of six models of melting furnaces which are designed for either gas or oil firing. The engineering features of these furnaces provide for a variety of operating requirements. Each furnace in the line is available in a range of capacities.

Bulletin 310. Pp. 4. Lindberg Engineering Co., 2443 W. Hubbard St., Chicago 12.

4 New Members on Advisory Council

The outgoing-Secretary of the Interior, Oscar Chapman, has appointed a sixty-five-member gas industry advisory council for 1953. He reappointed 61 members of the 1952 council. Four new members are: Robert W. Ott, St. Louis; Frank C. Smith, Houston; Norman B. Bertolette, Hartford; and John A. Weiser, Newport, R. I. The gas industry advisory council advises the secretary and the Petroleum Administration for Defense on gas matters involved in national defense.

G. M. Carvlin New Koppers VP&GM

George M. Carvlin has been elected successor to Joseph Becker in the position as vice president and general manager, engineering and construction division, Koppers Company, Inc. He has been with Koppers since 1925 in operating and sales positions and became a vice president of the engineering division in 1943. In 1950, he was named assistant general manager.

Curbs May Be Removed in 1953

Next Spring may bring removal of governmental restrictions on expansion of natural gas service. Petroleum Administration for Defense hints in reporting on a survey of the natural gas situation that the agency hopes to lift the curbs as soon as defense needs pass and "this date, we believe, is not too far in the future." The restrictive order, imposed by PAD in August, 1951, limits the number of new domestic customers in New York, New Jersey, Connecticut, Massachusetts, Rhode Island, Delaware, the District of Columbia and parts of Michigan. It also requires PAD authority for the addition of new industrial consumers.

UGI Realigns Officers in Merger

The election of John A. Frick, Andrew S. Morgan, Leonard B. Richards, Allyn C. Taylor and Charles E. Warsaw as additional vice-presidents of The United Gas Improvement Company, effective January 1, has been announced by Walter E. Long, U.G.I. president.

Mr. Long also announced the completion of arrangements for the merger into U.G.I. of all its operating utility subsidiaries.

Under the merger each of the present subsidiaries will become a division of U.G.I. The newly-elected vice-presidents, who were presidents of the subsidiary companies, will continue in their present locations:

John A. Frick, Lehigh Valley gas division

Andrew S. Morgan, Lancaster County gas division

Leonard B. Richards, Harrisburg gas division

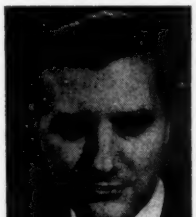
Allyn C. Taylor, Reading gas division

Charles E. Warsaw, Luzerne electric and gas division

Hudson W. Reed, a U.G.I. vice-president since 1949, and president of The Philadelphia Gas Works Company, will be in charge of operations in the Philadelphia Gas Works division.

Judd, Ass't to Pres., Stewart-Warner

William E. Judd, general sales manager of the South Wind heating equipment division, Stewart-Warner Corp., since 1949, has been appointed assistant to James S. Knowlson, president and board chairman.



William E. Judd

Mr. Judd started in the heater service department in 1942, was chief engineer on the West Coast, later becoming chief field engineer and then assistant general sales manager.

A native of Chicago, Mr. Judd was associated with a local law firm prior to joining the Stewart-Warner organization. He attended the University of Chicago and Loyola law school. His appointment fills the vacancy created by the appointment of Leonard L. Robb as head of wholesale sales of Alemite lubrication equipment and Stewart-Warner Instruments in 1952.

Wimberly Again FPC Vice Chairman

Commissioner Harrington Wimberly, of Oklahoma, has been reelected vice chairman of Federal Power Commission for the calendar year 1953. Mr. Wimberly, who has been a member of the FPC since October 5, 1945, served as vice chairman during 1952, also in 1947 and all of 1948.

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FPC SAYS . . .

OPERATING REVENUES AND INCOME—OCTOBER 1952

Operating revenues of natural gas companies reporting to the commission totaled $151,565,243 in October of 1952, an increase of 25.6 per cent over October 1951 receipts. For the twelve months ended October 31, 1952, revenues aggregating $1,816,616,629 or 16.9 per cent higher than received in the months ended October 31, 1951.

Gas utility operating income for October, 1952, amounted to $15,859,051, up 32.6 per cent from October of last year. For the twelve months ended October, 1952, gas utility operating income was $268,505,515, representing an increase of 9.8 per cent over the $244,514,980 reported for the comparable period ended in October, 1951.

Net gas utility plant of the reporting companies aggregated $4,621,202,515 on October 31, 1952, up 14.3 per cent over the report a year ago.

Gas sales to ultimate consumers during the month were 194.09 MMcf an increase of 13.3 per cent over October, 1951.

Net income of the companies for October, 1952, was $10,998,721, up 58.2 per cent from the October, 1951 net. For the twelve months ended October, 1952, net income represented an increase of 6.3 per cent over the comparable period ended October, 1951.

TEXAS-OHIO GAS CO. DECISION IS TENTATIVE

The opinion and order issued last November 7, denying applications by Texas-Ohio Gas Company, of Houston, Tex., for authority to construct a 1,406-mile pipeline and to import natural gas from Mexico, have been designated as a tentative decision instead of a final action, and parties to the proceeding were given twenty days to file exceptions.

Texas-Ohio and two interveners, Public Utilities Commission of Ohio and Reserve Natural Gas Corporation, had asked for rehearing of the November 7 opinion and order and argued that the intermediate decision procedure had not been waived.

Subsequent to the expiration of the twenty-day period in which the parties may file exceptions to the tentative decision, the commission must issue a further order, adopting or modifying the tentative decision, which will become its final action in the proceeding.

Texas-Ohio is proposing to build a $185,000,000 pipeline extending from the U.S.-Mexican border in Hidalgo County, Tex., to a terminus near Lancaster, Ohio. Texas-Ohio planned to sell all of its gas to Reserve Natural, a newly-formed corporation, at the Ohio terminum of the line.

In its November 7 opinion and order, the Commission found that the company "has failed on this record to show that the proposed service, construction or operation is or will be required by the present or future public convenience and necessity."

NORTHEASTERN

A hearing will reconvene January 26 in Washington, D. C., in the proceedings involved a suspended $749,000 annual wholesale natural gas rate increase by Northeastern Gas Transmission Co. Northeastern supplies wholesale customers in New England. The hearing was recessed last March 18 to be reconvened upon order of the commission. Northeastern's rate increase has been under FPC suspension since November 1, 1951, but has been in effect under bond since last April 1.

TEXAS EASTERN TRANSMISSION

An interim settlement has been approved in a rate suspension proceeding involving Texas Eastern Transmission Corporation, under which that company placed into effect on December 1 a wholesale natural gas rate increase totaling $26,180,000 per year, based on estimated sales for 1953.

Texas Eastern at the same time substituted for its proposed $41,800,000 rate increase, now under suspension, an increase totaling about $37,800,000 per year, which includes the $26,180,000 that became effective on December 1. This $37,800,000 increase will continue under suspension.

NORTHERN NATURAL TO SUPPLY EMERGENCY GAS

Affirmed, with modifications, a presiding examiner's decision orders Northern Natural Gas Company to connect its pipeline system with the facilities of Public Service Corporation of Texas for deliveries of natural gas on an emergency basis.

Northern was directed to establish a connection with Public Service's system near Perryton, Tex., with the latter company to bear all costs of construction.

OHIO FUEL GAS REQUIRES CERTIFICATES

An opinion and order finds that The Ohio Fuel Gas Company must have FPC certificates for the continued operation of natural gas pipeline facilities constructed in 1950.

NORTHERN NATURAL SALE OF GAS LEASES

An oral argument has been scheduled in the proceedings involving the investigation of the transfer and sale by Northern Natural Gas Co. of all its gas leases and wells to Northern Natural Gas Producing Company, a wholly-owned subsidiary.

STORAGE CERTIFICATE MODIFIED

The certificate issued last September to Natural Gas Storage Company of Illinois has been modified to the extent of providing that the storage gas will be owned by utility customers of two affiliates of the storage company instead of by the affiliates themselves as originally authorized.

The storage company had first proposed to store natural gas for the account of Natural Gas Pipeline Company of America and Texas Illinois Natural Gas Pipeline Company. The three companies are subsidiaries of Peoples Gas Light and Coke Company. Last month, however, the storage company filed an application requesting the modification, to permit ownership of the gas by the affiliates' customer companies.

Under the new plan, Natural and Texas Illinois will continue to sell the present contract volumes to their customer utilities, but will make delivery to the storage company for their customers' account of the volumes of gas designated by each customer utility for storage. This storage service will be performed under a tariff to be filed with FPC by the storage company, and under service agreements to be entered into directly with the customer utilities of Natural and Texas Illinois.

The change in ownership of the storage gas is necessary, the storage company said, to enable it to effect certain agreements designed to protect the institutional investors holding the debt securities of the storage company against the chance of geological or other difficulties encountered in the operation of the storage project.

EL PASO RATE INCREASE EFFECTIVE

An order has been issued making effective a proposed $15,287,000 increase in wholesale natural gas rates by El Paso Natural Gas Company, subject to the posting of a $1,500,000 bond by the company and subject to the refund of any amounts which the FPC subsequently disallows.

El Paso filed the proposed increase last June 30 and the Commission on August 1 issued an order suspending the new rates pending hearing and decision. Under the Natural Gas Act, a suspended rate increase may be placed into effect under bond if the proceeding is not concluded after five months.

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Gas Industry Seems Determined to Battle Some of Its Major Problems This Year

(Continued from page 15)

expectation of broad and unnamed gratuitous benefits to business.

The invigorated programs of promotion, advertising, research, public relations and hard personal selling in competitive business are much more to our liking as the approach that will make the year (or the next four years) a period of advancing accomplishment.

That seems to be the direction of thinking by the presidents of the two largest gas industry associations who viewed this year factually and emphatically for its potentials of further advance in a coordinated manner, with high benefits to both groups.

Frank C. Smith, AGA president, and Houston Natural Gas Company president, pointed directly to a keener competition this year but expressed a confidence in the telling sales effects of constant improvement in utility-appliance manufacturer coordination.

James F. Donnelly, Gas Appliance Manufacturers Association president, and vice president in charge of sales, Servel, Inc., directed his emphasis to the studied market that is available to effective appliance salesmanship and he too, views the AGA-GAMA liaison as resulting in agreement on purpose, objectives and procedures, "far beyond anything accomplished in any prior year."

Frank C. Smith says . . .

"Although the gas industry faces many challenges, its prospects are bright for establishing new records in 1953.

"Competition will be keener and the gas industry will need every skill and talent at its disposal to maintain and increase its position of leadership in the residential and industrial and commercial fields.

"Long range plans formulated by the Association and its working committees, will be made operative, with the cooperation of all branches of the industry.

Frank C. Smith

"A tremendous demand for gas services still exists. AGA estimates that nearly $1.7 billion dollars will be spent on new construction and plant expansion in 1953. Natural gas construction next year will cost more than $1.57 billion. Millions of dollars will be spent in increasing the industry's underground storage capacity. . . .

"The gas utility companies were serving 27,019,000 customers at the end of 1952, including about 314,000 LP gas customers served directly by gas utility companies. This was a gain of . . . 6.0 per cent over . . . the end of 1951.

"There were 24,914,000 residential gas customers on gas utility lines at the end of 1952, an increase of 6.0 per cent over a year ago. It is estimated that nearly 6,250,000 additional customers are being served with LP gas in areas not served by the gas utilities.

"Total sales of gas in 1952 amounted to 52,557 million therms, an increase of 9.0 per cent over . . . 1951. Natural gas sales totaled 49,192 million therms, up 10.0 per cent from a year previous. Manufactured and mixed gas sales were down 3.8 per cent. . . .

"Revenues from sales of gas were $2,455,022,000 in 1952, a gain of 10.2 per cent over . . . 1951. Natural gas sales revenues were $1,951,735,000, a rise of 17.1 per cent . . . manufactured and mixed gas revenues declined 10.9 per cent.

"Construction of more than 5,800 miles of natural gas pipeline was authorized by the Federal Power Commission in 1951 . . . 5,000 more in 1952. Applications for about 13,500 miles . . . approved . . . or were pending at the close of the year. These additions bring the Nation's natural gas pipeline system of gathering, transmission and distribution lines to total about 342,500 miles today.

"Supply of natural gas continues ample to meet this ever-increasing demand. AGA . . . estimates that at the end of 1951 the nation's proved recoverable reserves of natural gas were about 193.8 trillion cubic feet, a gain of 8.2 trillion cubic feet over the previous year. Reserves continue to lift the total of proved recoverable reserves.

"The [AGA] bureau of statistics estimated that more than $5.6 billion would be spent by the gas industry in the five-year period from 1952 through 1956 for the construction of new facilities and expansion of the present plant.

"The industrial and commercial gas load now accounts for nearly 40 per cent of total gas industry revenues. Revenues from sales of industrial gas gained more than 15 percent and commercial gas revenues were up more than 9 per cent during the year.

"The frequency of accidents to [gas industry] employees has been steadily reduced over the past four years. Reports submitted by gas utilities to National Safety Council indicate a reduction of 12 per cent . . . in 1952. . . .

"The great success of the PAR Plan is demonstrated by the willingness shown by the gas utility companies in increasing contributions to the total of $2,000,000 a year for further efforts in these three fields."

James F. Donnelly says . . .

"The gas appliance picture is far, far brighter than it was a year ago. There are hard facts on which to base forecasts of better business for 1953. The industry moves into the new year at a faster sales pace, without overwhelming inventories, with some relief from materials headaches and the promise of full relief to come. There's business to be done—and I'm sure the industry will go out and do it.

James F. Donnelly

"The new year will intensify the trend started in 1952 toward the use of gas appliances for a greater variety of household functions.

"This trend, of course, began in the construction of new housing—both public and private. Now it is spreading into the booming field of home remodelling.

"This—in combination with the expansion of natural gas service and effective promotion by all branches of the industry—made it possible by the year's end for most gas appliance manufacturers not only to recover from the dismal beginnings of 1952, but also to make important gains against competitive appliances and equipment.

"The stepped-up sales pace of late 1952 seems certain to carry over well into 1953

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—and possibly through the entire year.

"As a result of regular meetings of the liaison committees of GAMA and AGA during the past year, and the work of their various task forces, there is unity of purpose, understanding of mutual objectives, and agreement on procedures—far beyond anything accomplished in any prior year.

"This manufacturer-utility cooperation will result immediately in constructive steps in marketing practices and policies, in sales promotion activities, appliance servicing, utilization research, appliance development, appliance requirements and industry public relations.

"It is encouraging to note that all phases of the industry will increase their 1953 budgets for advertising and promotion.

"Makers of gas house heating equipment were able to achieve during 1952 substantial sales increases over the previous year.

"Since the most spectacular gains were registered during the latter part of the year in a trend that seems sure to last into 1953.

"Gas water heater sales slumped during the first half of 1952 . . . a third quarter spurt . . . enabled the industry to finish the year about even with the 1951 total.

"Range sales moved up satisfactorily during the latter part of 1952 . . . the strength of demand at the year's end indicates continuing improvement in the picture. Range sales should benefit greatly from the industrywide promotion program planned by members of the GAMA domestic gas range division, and from utility cooperation. . . .

"Gas clothes dryers seem certain to hit an all-time high in 1953. This comparatively new member of the gas appliance family has no problems of saturation. The problem so far has been one of producing enough to meet the demand.

"The incinerator, like the clothes dryer, is relatively a newcomer in the industry. It, too, has a vast potential market in which it is just beginning to make a dent.

"Refrigerators recovered spectacularly during the latter part of 1952 following an equally spectacular slump in the first six months. In 1953, starting at an accelerated sales pace, and offering the dramatically new and different "ice-maker," Servel anticipates its biggest sales year. . . .

"Prospects of increased metal supplies promise great benefits to manufacturers of hotel, restaurant and commercial gas equipment because of their production of durable, heavy duty equipment . . . there is a decidedly favorable tinge because of modernization activity. . . .

"During recent years the use of gas as an industrial fuel has increased far more rapidly than that of any other fuel. Now, the industry expects even more dramatic expansion because of the growing understanding that natural gas is not only a fuel, but also a precision tool. Intensive promotion of the new and varied uses of gas in industry by the makers of this equipment will firmly establish gas as the number-one fuel for industrial heat applications.

"As the rest of the industry goes, so goes the sales volume of meters, valves, regulators, controls and accessories manufacturers. With the materials situation eased, the manufacturers will be in a better position to serve the rest of the industry."

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GAS INDUSTRY CALENDAR

February

2-4 AGA Home Service workshop, Baker Hotel, Dallas.

March

16-20 National Association of Corrosion Engineers, Hotel Sherman, Chicago.
26-27 NEGA, Hotel Statler, Boston.
27-29 Mid-West regional gas sales conference, Edgewater Beach Hotel, Chicago.
30-Apr. 1 Mid-West Gas Assn., Broadmoor Hotel, Colorado Springs, Colo.

April

12-16 AGA distribution, motor vehicles and corrosion conference, Hotel Sherman, Chicago.
13-15 AGA industrial and commercial gas sales conference, Hotel Warwick, Philadelphia.
16-18 Florida-Georgia Gas Association, Hotel Biltmore, Palm Beach.
21-23 Southwestern measurement course, University of Oklahoma, Norman.
23-24 Indiana Gas Association convention, French Lick Springs Hotel, French Lick.
27-29 Mid-West regional gas sales conference, Edgewater Beach Hotel, Chicago.
30-May 1 AGA natural gas technical conference, Edgewater Beach Hotel, Chicago.

May

3-8 LPGA convention and show, Conrad Hilton Hotel, Chicago.
4-8 AGA industrial gas school, Sheraton-Cadillac Hotel, Detroit.
10-15 National restaurant convention and exposition, Navy Pier, Chicago.
11-13 Southern Gas Assn., Jung Hotel, New Orleans.
11-15 National Fire Protection Assn., Edgewater Beach Hotel, Chicago.
12-14 Pennsylvania Gas Association convention.
20-22 GAMA annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.
24-27 AGA production and chemical conference, Hotel New Yorker, New York.
28-29 The Natural Gas and Petroleum Association of Canada, London, Ontario.

June

14-18 Canadian Gas Association, Windsor Hotel, Montreal.
22-23 Michigan Gas Association, Grand Hotel, Mackinac Island.

September

9-11 Pacific Coast Gas Association, San Francisco.

October

19-23 National metal exposition, Public Auditorium, Cleveland.
26-29 AGA annual convention, Kiel Auditorium, St. Louis.

PROFESSIONAL DIRECTORY

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